

# **Technical Manual WD 290**

Item Number: 10274-109

Version: 001-08/08

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# 1 Introduction

## 1.1 Before you read on

Your product meets high standards and is easy to operate. Nevertheless, please take time to read these instructions carefully. You will become familiarised with your product and be able to use it to its best.

## 1.2 Target group

These instructions are a component of the product and are intended for the owner, users, operators, as well as servicing personnel. They must be accessible for this group of persons.

## 1.3 Changes

The text, graphics and data correspond to the technical status of the product at the time of going to print. Changes due to further development may occur.

Language original for this document is German (DE)

## 1.4 Symbols and references used

The following symbols and occupational safety alerts used throughout the documentation are important to avoid harm to health and life.



---

**Danger**

Indicates a hazard with high risk which, if not avoided, causes death or serious injury.

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**Warning**

Indicates a hazard with medium risk which, if not avoided, can cause death or serious injury.

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**Caution**

Indicates a hazard with low risk which, if not avoided, can cause minor or moderate injury.

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**Note**

Operating tips and useful information on the best possible utilization.

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## 2 For your safety

We affirm with the EC Declaration of Conformity and the CE mark that this product complies with the basic health and safety requirements in accordance with Directive 93/42/EEC Annex II (see Chap. 14 "Conformity and certifications").

Hazards may still arise from the product if it is used incorrectly by inadequately trained personnel or not as intended.

### 2.1 Intended use

This product is exclusively approved for the uses stated in the instructions. Namely for central sterilisation, substerilisation in surgery, in hospitals, clinical laboratories and in industry. All other applications are considered as non-intended use.

### 2.2 Care responsibilities for dealing with the device

- Only use **original racks, spare parts and accessories**
- **Load racks as intended** (see Chap. 5 "Device description")
- **Daily maintenance work** on the device must be performed regularly and according to instructions (see Chap. 12 "Maintenance")
- **Validation** of the program parameters must be performed regularly (see Chap. 2.5 "Process validation")
- **Installation, deinstallation, maintenance or modification** must only be performed by persons authorised by Belimed

### 2.3 Instruction of personnel

This product must only be used, maintained and repaired by authorised, trained and briefed personnel. This assumes that these instructions are read and understood.

Responsibilities and competencies in operation, servicing and maintenance must be clearly defined and observed.

## 2.4 Fields of application for the device

Cleaning and disinfection of:

- surgical instruments
- minimal-invasive instruments
- instruments used in anaesthesia and intensive care
- baby bottles and teats
- containers
- OP shoes
- laboratory instruments from research and production
- rigid endoscopes
- eye instruments
- neurosurgery

## 2.5 Process validation

The aim of process validation is to achieve a high level of safety in the reconditioning of medical devices in order to afford the operators and patients the greatest possible protection.

Process validation consists of:

- a) **Type testing / factory testing**
- b) **Process validation consisting of:**
  - IQ - Installation Qualification
  - OQ - Operational Qualification
  - PQ - Performance Qualification
- c) **Routine testing / Annual requalification**



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### Note

Further information on process validation may be obtained from Belimed Customer Service.

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### Caution

Validation must only be performed by authorised persons!

Devices must only be operated with processes validated according to instructions! Only use components (*washing utensils, racks, program and chemicals*) that have been validated together.

The safety of operators and patients may be compromised if the devices used are not validated in accordance with the regulations.

---

## 3 Device specifications

### 3.1 Device dimensions

| Dimensions                                    | Measurements |
|-----------------------------------------------|--------------|
| Height                                        | 1,840 mm     |
| Width                                         | 900 mm       |
| Depth                                         | 940 mm       |
| Height of base                                | 100 mm       |
| Loading height                                | 870 mm       |
| Clearance height of washing chamber min./max. | 690 mm       |
| Clearance width of washing chamber min./max.  | 630 mm       |
| Clearance depth of washing chamber            | 800 mm       |
| Dimension height of rack                      | 670 mm       |
| Dimension width of rack                       | 610 mm       |
| Dimension depth of rack                       | 750 mm       |
| Unloaded weight                               | 315 kg       |
| Total weight                                  | 390 kg       |
| Volume of washing chamber min./max.           | 310/350 l    |

(See Chap. 5 "Device description")

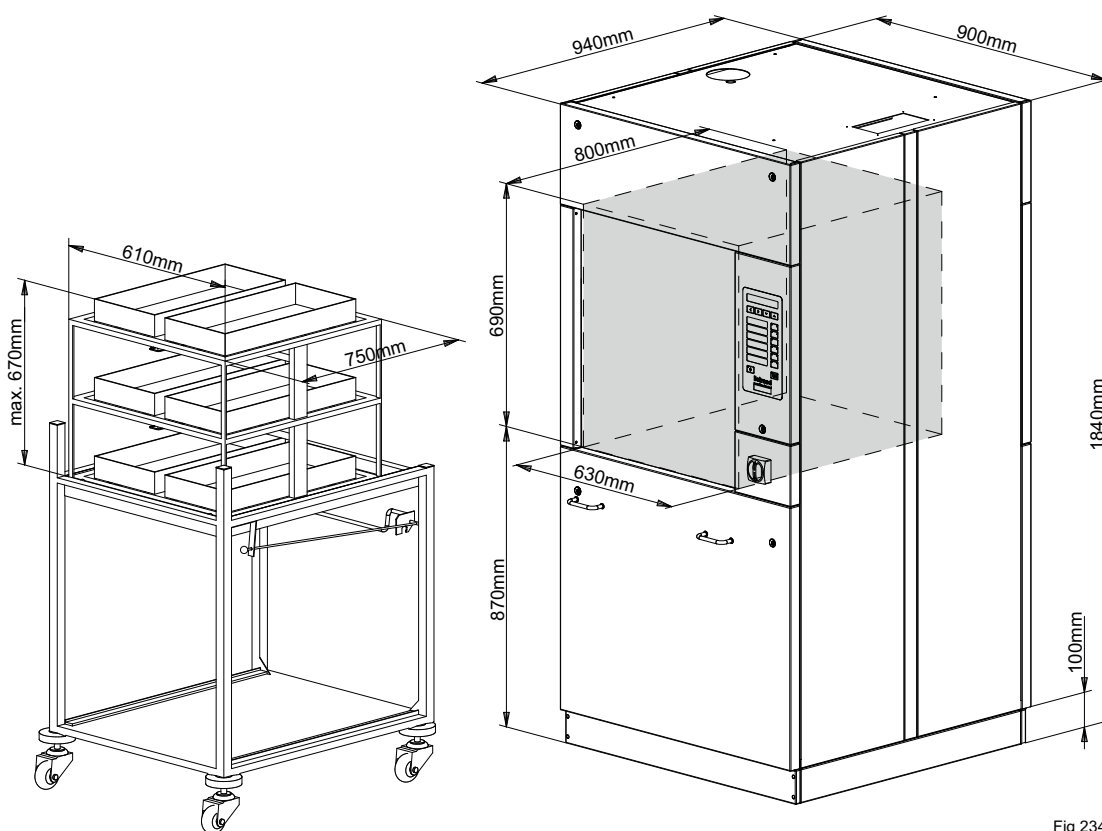


Fig 234

### 3.2 Device dimensions with condenser (optional)

| Dimensions                                    | Measurements |
|-----------------------------------------------|--------------|
| Height                                        | 2,200 mm     |
| Width                                         | 900 mm       |
| Depth                                         | 940 mm       |
| Height of base                                | 100 mm       |
| Loading height                                | 870 mm       |
| Clearance height of washing chamber min./max. | 690 mm       |
| Clearance width of washing chamber min./max.  | 630 mm       |
| Clearance depth of washing chamber            | 800 mm       |
| Dimension height of rack                      | 670 mm       |
| Dimension width of rack                       | 610 mm       |
| Dimension depth of rack                       | 750 mm       |
| Unloaded weight                               | 375 kg       |
| Total weight                                  | 500 kg       |
| Volume of washing chamber min./max.           | 310/350 l    |

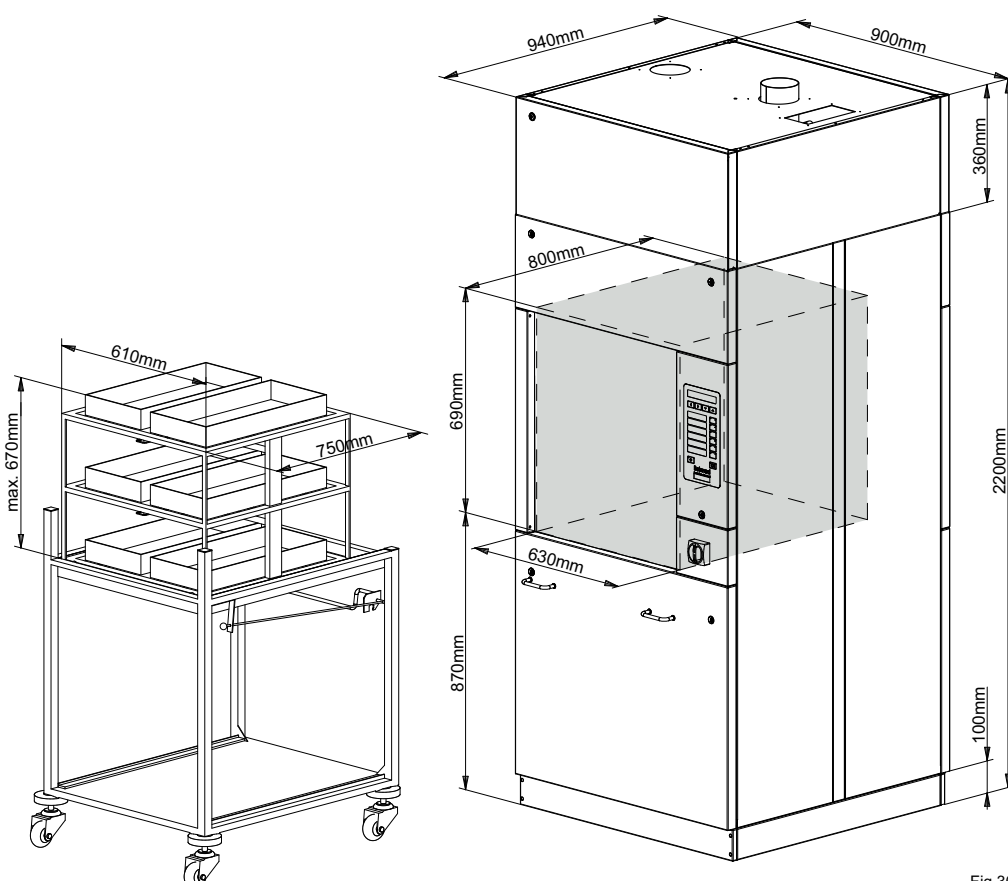


Fig 368

### 3.3 Optional additional components

#### 3.3.1 Additional panneling

- Side panel, 2 doors
- Side panel, single door
- Rear panel, single door
- Base panelling
- Intermediate panelling
- Panelling for condenser and DI water pre-heating

Detailed descriptions (see installation instructions WD290 Item No. 10273)

#### 3.3.2 Switchable heating

- Dual water heating with steam or electricity, manually switchable (see instructions WD290 Item No. 10268) and (spare parts list Item No. 76861)
- Dual water heating with steam or electricity, automatically switchable (see spare parts list Item No. 76861)

#### 3.3.3 Condenser with heat retrieval

- Condenser with DI water pre-heating and heat retrieval
- Exhaust air condenser
- DI water pre-heating

Detailed descriptions:

(Chap. 6.10.11 "Pre-heating temperature / holding time DI boiler")

(Chap. 6.10.12 "Disinfection temperature / disinfection time DI boiler")

(Chap. 6.11.13 "DI Boiler heater interlock with tank heater")

(Chap. 3.6.7 "Electrical function diagram")

#### 3.3.4 Dosing pump set with "empty" indicators and flow meter

- Empty state monitor for dosage media small/large (see Chap. 6.7 "Dosing module") and (instructions Item No. 10268).
- Flow monitor for dosage media (see Chap. 6.7 "Dosing module") and (instructions Item No. 10268).
- Dosing pumps with "empty" indicators (*max. 5 units*) (see Chap. 6.7 "Dosing module") and (instructions Item No. 10268).

### 3.3.5 Miscellaneous

- Diverse racks (instructions supplied separately with the rack)
- Steam heating (*tank heating*) (see Chap. 6.11.17 "Delay interval for washing-liquid heating") and (Chap. 3.6.8 "Electrical function diagram with steam drying")
- Steam dryer (see Chap. 6.11.14 "Steam heated dryer") and (Chap. 3.6.8 "Electrical function diagram with steam drying")
- Floor pan with leakage - sensor (see Chap. 8.2.2 "SB Floor pan leakage") and (installation instructions Item No. 73895)
- Drainage pump for emptying the device (see Chap. 6.11.5 "Drain")
- Build-in printer LS or US (see instructions WD290 Item No. 10268)
- Tabletop printer (see installation instructions Item No. 73726)
- Service program recipe management with diagnostic software CADI for PC via RS 232 (see instructions Item No. 73473)
- Pressure gradient monitoring system sterile filter to dryer (see spare parts list Item No. 76848)
- Modem connector for remote maintenance (see Chap. 6.11.28 "Modem connection (optional)")
- Automatic loading and unloading (see instructions Item No. 76356)
- User, content and rack identification system using barcode reader (instructions Item No. 73939)
- Content documentation system with PC ICS 8535 or 8565 (see Chap. 6.11.19 "Allocation of address for the ICS 85X5 archiving system")
- Emergency Stop unloading side (see instructions WD290 Item No. 10268)
- IQ, OQ, PQ documentation
- Barcode reader for PC (siehe Chap. 6.10.16 "Automatic rack recognition") and (instructions Item No. 73939)
- Potential-free contacts (see Chap. 6.11.15 "Potential-free output K28, K57 and K58") and (installation instructions Item No. 76896)

### 3.3.6 Independent content documentation system (IPD)

Independent content documentation system (IPD) for conductivity measurement, analogue pressure, two additional temperature sensors and redundant flow monitoring system. Process verification between controller and independent content documentation system

Detailed information:

(see technical manual IPD Item No. 76666)

### 3.4 Technical data

| Performance characteristics / components                                              | Data/performance/specifications |
|---------------------------------------------------------------------------------------|---------------------------------|
| Nominal scooping performance of circulation pump                                      | 900 l/min                       |
| Effective scooping performance of circulation pump                                    | 750 l/min                       |
| Power rating of circulation pump                                                      | 2200 W                          |
| Material of pump rotor                                                                | Chromium steel 1.4301           |
| 400 V electrical tank heating capacity                                                | 22.5 kW                         |
| 200-230V electrical tank heating capacity                                             | 18 kW                           |
| Steam tank heating capacity (4.5 bar)                                                 | 30 kW                           |
| Length of washing arm in the device                                                   | 600 mm                          |
| Drain valve                                                                           | Chromium steel 1.4301           |
| Dosing pumps                                                                          | 24 V AC / 10l / min             |
| Number of dosing pumps in basic model                                                 | 3 - 5                           |
| Flow meters for impulse measurement                                                   | Max. 4 (optional)               |
| Dryer electrical heating capacity                                                     | 10.5 kW                         |
| Dryer heating capacity for steam and pure steam                                       | 16 kW at 3 bar                  |
| Dryer (2 brush-free DC turbines)                                                      | 2.4 kW                          |
| Dryer fan ventilation capacity                                                        | 380 m³/h                        |
| Air filter: Filter class H13 EN 1822, retention rate for particle size from 0.1-0.2 µ | 99.95%                          |
| Heat radiation when standing free                                                     | 500 (+/- 200) W/h               |
| Noise level                                                                           | 62 dB (A)                       |
| Opening and closing of washing chamber doors                                          | automatic                       |
| Door safety shut-off                                                                  | Safety switch actuator          |
| Washing chamber seal                                                                  | Silicone                        |
| Washing chamber and doors of chromium steel (CNS)                                     | 1.4404, AISI 316 L              |
| Frame and panelling of chromium steel (CNS)                                           | Chromium steel 1.4301           |
| Thickness of washing chamber wall                                                     | 1.5 mm                          |
| Drainage pump (optional)                                                              | 100 l/min                       |

## 3.5 Setup conditions

### 3.5.1 Surrounding conditions

| Criterion                       | Requirement            |
|---------------------------------|------------------------|
| Max. altitude of setup location | 1600 m above sea level |
| Max. humidity                   | 80%                    |
| Surrounding or room temperature | +5 °C to +40 °C        |
| Degree of contamination         | 2 (P2)                 |

**Caution**

Avoid direct sunlight and one-sided air currents (close to window).

### 3.5.2 Building conditions

| Criterion                                | Requirement           |
|------------------------------------------|-----------------------|
| Space required per machine               | 5 m <sup>2</sup>      |
| Min. load capacity of floor              | 500 kg/m <sup>2</sup> |
| Floor characteristics                    | fire proof            |
| Minimum distance between machines        | 50 mm                 |
| Evenness of floor - difference in levels | < 10 mm               |

### 3.6 Connection modules

#### 3.6.1 Electric (possible versions)

| Voltage                                                                                                                                                                                                                                          | 400 V 3N<br>AC / 50 Hz | 208 V<br>3 AC / 60 Hz | 200-220 V<br>3 AC / 50 Hz | 200-220 V<br>3 AC / 60 Hz |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------|---------------------------|---------------------------|
| <b>Electrically heated</b> <ul style="list-style-type: none"> <li>Washing chamber</li> <li>Dryer</li> <li>DI Boiler <i>"locked"</i></li> </ul> Power rating of connection<br>Fuse                                                                | 25 kW<br>40 A          | 20 kW<br>50 A         | 21 kW<br>60 A             | 21 kW<br>60 A             |
| <b>Steam heated</b> <ul style="list-style-type: none"> <li>Washing chamber</li> </ul> <b>Electrically heated</b> <ul style="list-style-type: none"> <li>Dryer</li> <li>DI Boiler <i>"locked"</i></li> </ul> Power rating of connection<br>Fuse   | 13 kW<br>25 A          | 13 kW<br>40 A         | 13 kW<br>40 A             | 13 kW<br>40 A             |
| <b>Steam heated</b> <ul style="list-style-type: none"> <li>Washing chamber</li> <li>Dryer</li> </ul> Power rating of connection<br>Fuse                                                                                                          | 3.5 kW<br>16 A         | 3.5 kW<br>15 A        | 3.5 kW<br>16 A            | 3.5 kW<br>16 A            |
| <b>Steam heated</b> <ul style="list-style-type: none"> <li>Washing chamber</li> <li>Dryer</li> </ul> <b>Electrically heated</b> <ul style="list-style-type: none"> <li>DI Boiler <i>"unlocked"</i></li> </ul> Power rating of connection<br>Fuse | 13 kW<br>25 A          | 13 kW<br>40 A         | 13 kW<br>40 A             | 13 kW<br>40 A             |

(See Chap. 6.11.13 "DI Boiler heater interlock with tank heater")

### 3.6.2 Water connections

|                                                                               |                                              |        |       |
|-------------------------------------------------------------------------------|----------------------------------------------|--------|-------|
| <b>Cold water (CW)</b><br>(see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)") | Min. temperature                             | °C     | 5     |
|                                                                               | Max. temperature                             | °C     | 20    |
|                                                                               | Max. water hardness                          | °dH    | < 3   |
|                                                                               | Total salt                                   | mg/l   | < 500 |
|                                                                               | Chloride content                             | mg/l   | < 100 |
|                                                                               | pH                                           |        | 5-8   |
|                                                                               | Min. flow pressure                           | kPa    | 200   |
|                                                                               | Max. pressure                                | kPa    | 600   |
|                                                                               | Min. volume flow                             | l/min  | 8     |
|                                                                               | Connection thread on building side DIN 44991 | inch   | 3/4"  |
| <b>Warm water (WW)</b><br>(see Chap. 6.9.8 "Utility M2 Warm Water Step (WW)") | Max. temperature                             | °C     | 60    |
|                                                                               | Max. water hardness                          | °dH    | < 3   |
|                                                                               | Total salt                                   | mg/l   | < 500 |
|                                                                               | Chloride content                             | mg/l   | < 100 |
|                                                                               | pH                                           |        | 5-8   |
|                                                                               | Min. flow pressure                           | KPa    | 200   |
|                                                                               | Max. pressure                                | KPa    | 600   |
|                                                                               | Volume flow                                  | l/min  | 8     |
|                                                                               | Connection thread on building side DIN 44991 | inch   | 3/4"  |
| <b>DI Water (DI)</b><br>(see Chap. 6.9.10 "Utility M4 DI Water Step")         | Max. recommended conductivity                | µS/cm  | < 5   |
|                                                                               | pH                                           |        | 5-7   |
|                                                                               | Total hardness                               | mmol/l | 0.02  |
|                                                                               | Salt content                                 | mg/l   | < 10  |
|                                                                               | Phosphate                                    | mg/l   | < 0.5 |
|                                                                               | Silicate                                     | mg/l   | < 1   |
|                                                                               | Chloride                                     | mg/l   | < 2   |
|                                                                               | Min. flow pressure                           | kPa    | 200   |
|                                                                               | Max. pressure                                | kPa    | 600   |
|                                                                               | Volume flow                                  | l/min  | 8     |
|                                                                               | Connection thread on building side DIN 44991 | inch   | 3/4"  |
| <b>Waste water</b>                                                            | Max. temperature                             | °C     | 93    |
|                                                                               | Connection                                   | DN     | 55    |
|                                                                               | Max. short term discharge                    | l/min  | 150   |

Further information:

(6.9.6 "Parameter entry overview")

### 3.6.3 Steam

|                                                                                         |                                                  |        |                      |
|-----------------------------------------------------------------------------------------|--------------------------------------------------|--------|----------------------|
| <b>Heating steam</b>                                                                    | Max. steam gauge pressure                        | KPa    | 600                  |
|                                                                                         | Max. boiling temperature                         | °C     | 160                  |
|                                                                                         | Design capacity at 600 MPa/160 °C                | kg/h   | 50                   |
|                                                                                         | Connection thread (flat sealing)                 | Inch   | 1/2" external thread |
| <b>Water heating</b><br>(See Chap. 6.11.17 "Delay interval for washing-liquid heating") | Mass flow of saturated steam                     | kg/min | 0.8                  |
|                                                                                         | Consumption / batch at 3 bar                     | kg     | 12-16                |
| <b>Dryer</b><br>(See Chap. 6.11.14 "Steam heated dryer")                                | Mass flow of saturated steam                     | kg/min | 0.45                 |
|                                                                                         | Consumption / batch for 10 min drying (at 3 bar) | kg     | 4.5                  |

(See Chap. 3.6.5 "Connection requirements for installation")

### 3.6.4 Exhaust air

|                                                                                                                                                                                      |                                                                                                                          |                   |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------------|---------|
| <b>Exhaust air connection</b>                                                                                                                                                        | Connecting piece machine side                                                                                            | mm                | D 114.5 |
| <b>I. Exhaust facility connected directly to outdoor surroundings</b> <i>(not recommended)</i><br><br>Do not merge the exhaust facilities of several cleaning and disinfecting units | Max. length of exhaust air pipe on building side                                                                         | m                 | 5       |
|                                                                                                                                                                                      | Exhaust air volume flow                                                                                                  | m <sup>3</sup> /h | 250-350 |
|                                                                                                                                                                                      | Temperature average / short term max.                                                                                    | °C                | 70/90   |
|                                                                                                                                                                                      | Rel. humidity average / short term max.                                                                                  | %                 | 80/100  |
|                                                                                                                                                                                      | Exhaust air pipe maximum permissible pressure drop                                                                       | Pa                | 350     |
| <b>II. Connection without condenser to building exhaust facility with fan</b>                                                                                                        | Volume flow of building exhaust facility                                                                                 | m <sup>3</sup> /h | 250-350 |
|                                                                                                                                                                                      | Temperature average / short term max.                                                                                    | °C                | 70/90   |
|                                                                                                                                                                                      | Rel. humidity average / short term max.                                                                                  | %                 | 80/100  |
| <b>III. Connection with condenser to building exhaust facility with fan</b>                                                                                                          | Volume flow of building exhaust facility                                                                                 | m <sup>3</sup> /h | 250-350 |
|                                                                                                                                                                                      | Temperature average / short term max.                                                                                    | °C                | 70/90   |
|                                                                                                                                                                                      | Rel. humidity average / short term max.                                                                                  | %                 | <70/100 |
|                                                                                                                                                                                      | Condenser performance                                                                                                    | kW                | 2.7     |
|                                                                                                                                                                                      | Quantity of condensate<br>(applies to thermal disinfection only; A <sub>0</sub> 3000 93 °C; 12 minutes drying at 120 °C) | ml                | ~100ml  |

Further information:

(see Chap. 3.6.5 "Connection requirements for installation") and (6.9.12 "Condenser M6 functions")

### 3.6.5 Connection requirements for installation

|                                                                                        | Building side                                                                                                                                                                                                                                                                                                                                                                                 | Machine side                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Water connections:</b><br>CW, WW, DI<br>(See Chap. 3.6.2 "Water connections")       | <ul style="list-style-type: none"> <li>Shut-off valve 3/4 inch</li> </ul>                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>2 m of armoured tubing</li> <li>Fine filter 3/4" / mesh width 250µ</li> <li>Free flow passage</li> </ul>                                                                                          |
| <b>Drain</b>                                                                           | <ul style="list-style-type: none"> <li>Floor drain with syphon, heat resistant up to 93 °C</li> <li>Drainage nozzle OD (outside diameter) = 55 mm</li> </ul>                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>T-piece for condensate drainage ID= 20mm / OD= 26 mm</li> <li>Drainage tube EPDM ID = 55 mm</li> </ul>                                                                                            |
| <b>Drainage pump</b>                                                                   | <ul style="list-style-type: none"> <li>Drainage pipe with syphon, heat resistant up to 93 °C</li> </ul>                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>Max. delivery height 1m 100l/min (optional)</li> <li>Drainage tube EPDM ID = 19 mm</li> </ul>                                                                                                     |
| <b>Exhaust air</b><br>(See Chap. 3.6.4 "Exhaust air")                                  | <ul style="list-style-type: none"> <li>Exhaust air pipe ID = 115 mm, water resistant, waterproof</li> <li>Motor-driven exhaust flap</li> <li>Draught interruptor, exhaust air channel</li> </ul>                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>Exhaust air pipe OD = 114.5 mm</li> <li>Condensed water collector with drainage</li> <li>Exhaust flap with false-air opening</li> </ul>                                                           |
| <b>Electrical mains connection</b><br>(See Chap. 3.6.1 "Electric (possible versions)") | <ul style="list-style-type: none"> <li>50 Hz 400V 40 Amp 3 P+N electric heating</li> <li>50 Hz 400V 25 Amp 3 P+N steam heating</li> <li>60 Hz 208V 30 Amp 3P steam heating</li> <li>60/50 Hz 200V 60 Amp 3P</li> <li>Line safety switch 52A for phases L1, L2, L3</li> </ul> <p>Installation category (CAT II)</p> <p><b><i>Largest permissible mains voltage fluctuation +/- 10%</i></b></p> | <ul style="list-style-type: none"> <li>Cable 5x6mm<sup>2</sup>, L=4m, H07 RN-F</li> <li>Cable 5x2.5mm<sup>2</sup>, L=3.5m, H07 RN-F</li> <li>Protective tube L=1.3m, cable 60Hz/AWG 8</li> <li>Cable 4x10mm<sup>2</sup>, L=4m</li> </ul> |
| <b>Steam connection</b><br>(See Chap. 3.6.3 "Steam")                                   | <ul style="list-style-type: none"> <li>Two shut-off valves 1/2 inch</li> <li>Dirt separator 1/2 inch</li> <li>Isolated armoured tube 2 x 3.5 m</li> <li>Pressure gauge recommended</li> </ul>                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>One 2/2 solenoid valve 1/2" 24VAC</li> <li>Connection G1/2" 60° inner cone</li> <li>Outlet G1/2" 60° inner cone</li> <li>Two condensate separators 1/2"</li> <li>Two non-return valves</li> </ul> |



#### Warning

Maximum operating pressure 7 bar! A building excess-pressure protective device at the steam connection site with 7 bar response pressure must be provided.

Use certified armatures only!

**Note**

Pressurised air connection must not be provided.

Steam supply pipes and discharge pipes are flushed via bypass.

(Keep electrical supply and steam supply separate.)

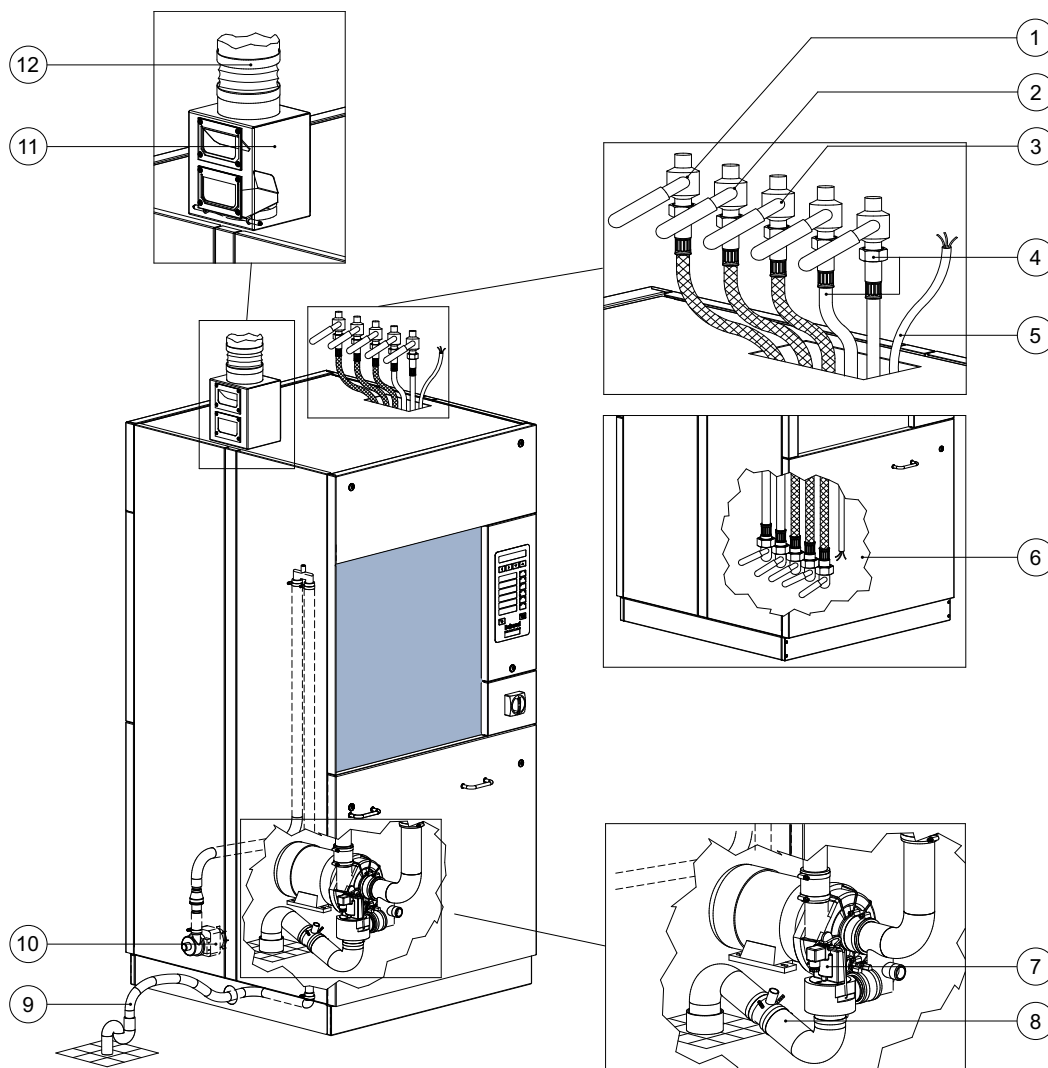
**3.6.6 Connection diagrams**

Fig 207

- 1 Cold water supply (blue)
- 2 Warm water supply (red)
- 3 DI water supply (green)
- 4 Steam connections (optional)
- 5 Main connecting cable
- 6 Floor-type connection
- 7 Drainage valve
- 8 Water drainage
- 9 Drainage tube
- 10 Drainage pump (optional)
- 11 Exhaust air casing
- 12 Exhaust air pipe

### 3.6.7 Electrical function diagram

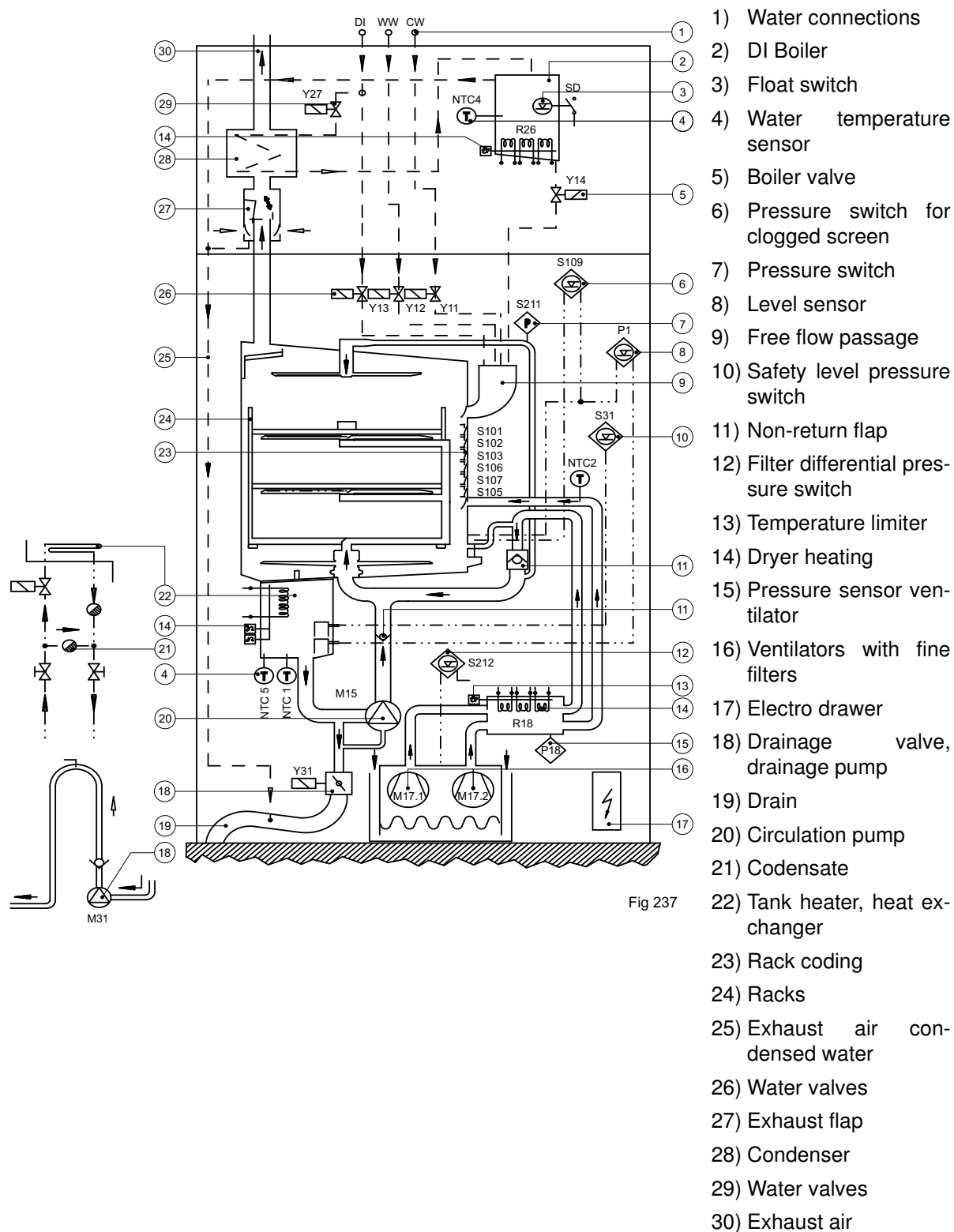


Fig 237

### 3.6.8 Electrical function diagram with steam drying

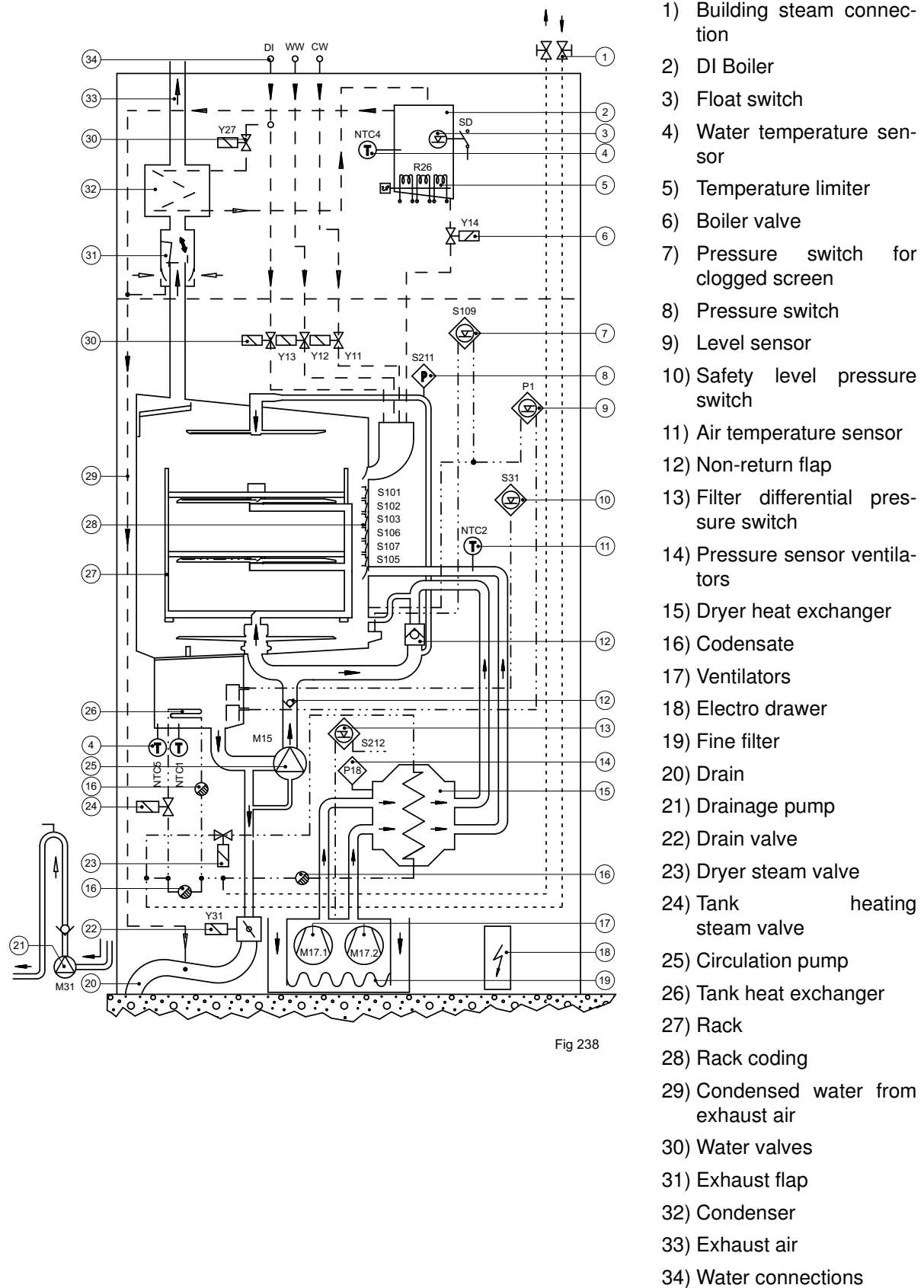


Fig 238

## 4 Consumption data

The following data in the table were measured with the single-tier rack.

| Description               | Water consumption (litres)* |           |           |           |           |           |            |            | Consumption of chemicals (ml) |               |      |             |     |
|---------------------------|-----------------------------|-----------|-----------|-----------|-----------|-----------|------------|------------|-------------------------------|---------------|------|-------------|-----|
|                           | CW                          |           | WW        |           | DI        |           | Total      |            | Type                          | Concentration |      | Consumption |     |
|                           | Min                         | Max       | Min       | Max       | Min       | Max       | Min        | Max        |                               |               |      | Min         | Max |
| 1. Pre Rinse              | 31                          | 40        |           |           |           |           | 31         | 40         |                               |               |      |             |     |
| 2. Washing**              | 16                          | 18        | 15        | 18        |           |           | 31         | 40         | Chemicals                     | 5.0           | ml/l | 155         | 200 |
| 3. Neutralisation         |                             |           | 31        | 40        |           |           | 31         | 40         | Neutraliser                   | 1.5           | ml/l | 46          | 60  |
| 4. Rinsing / disinfecting |                             |           |           |           | 31        | 40        | 31         | 40         |                               |               |      |             |     |
| <b>Total</b>              | <b>47</b>                   | <b>58</b> | <b>46</b> | <b>58</b> | <b>31</b> | <b>40</b> | <b>124</b> | <b>160</b> |                               |               |      |             |     |

\*depending on load

\*\*Relation CW / WW depends on temperature and programming

### 4.1 Water consumption for tiered tracks

1-tier rack approx. 31 litres

2-tier rack approx. 33 litres

3-tier rack approx. 34 litres

4-tier rack approx. 35 litres

5-tier rack approx. 36 litres

### 4.2 Water consumption for anaesthesia rack

Anaesthesia rack approx. 40 litres

## 5 Device description

### 5.1 Device loading side (LS)

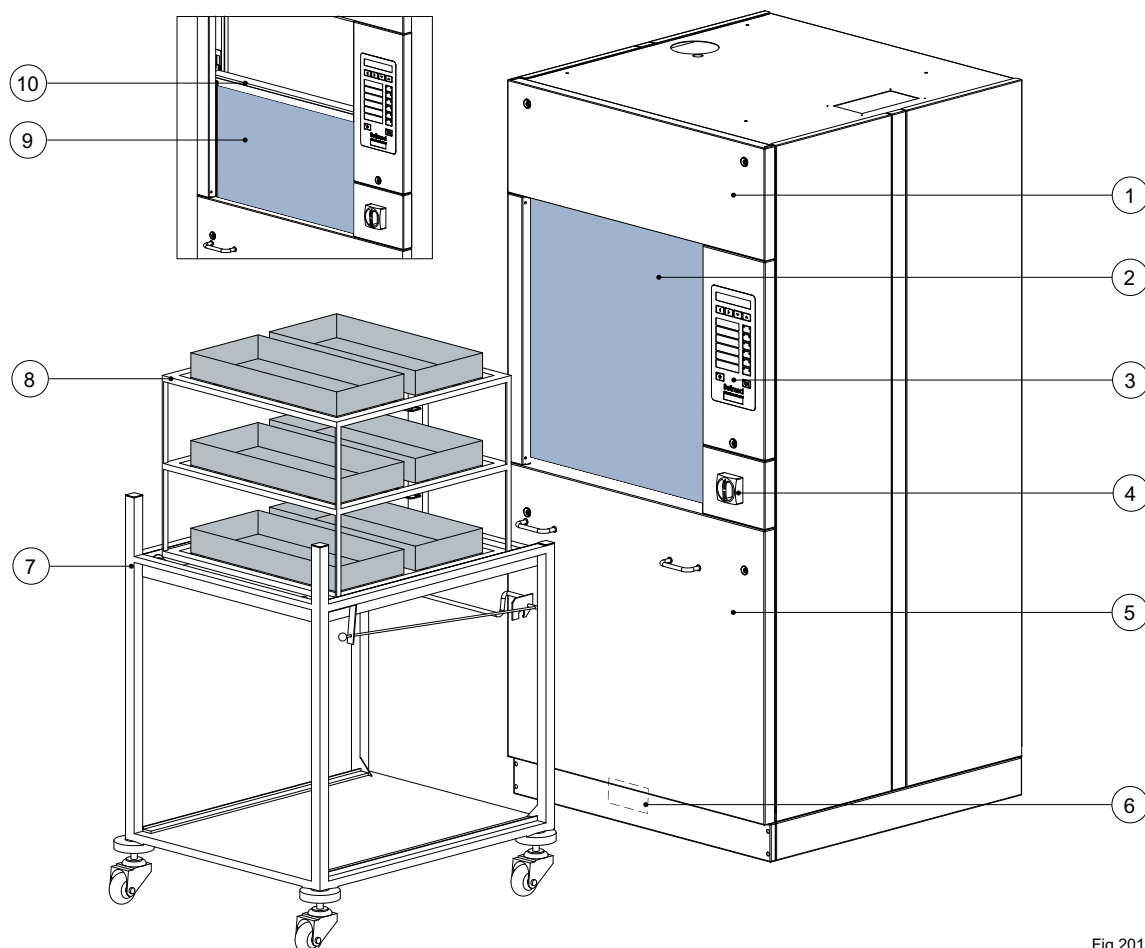


Fig 201

- 1 Door drive (behind the panel)
- 2 Washing chamber door made of double-layer safety glass
- 3 Operating unit
- 4 Main switch (with EMERGENCY OFF function)
- 5 Service panel
- 6 Location type label
- 7 Transfer cart
- 8 Rack
- 9 Automatic washing chamber door
- 10 Safety strip

## 5.2 Device unloading side (US)

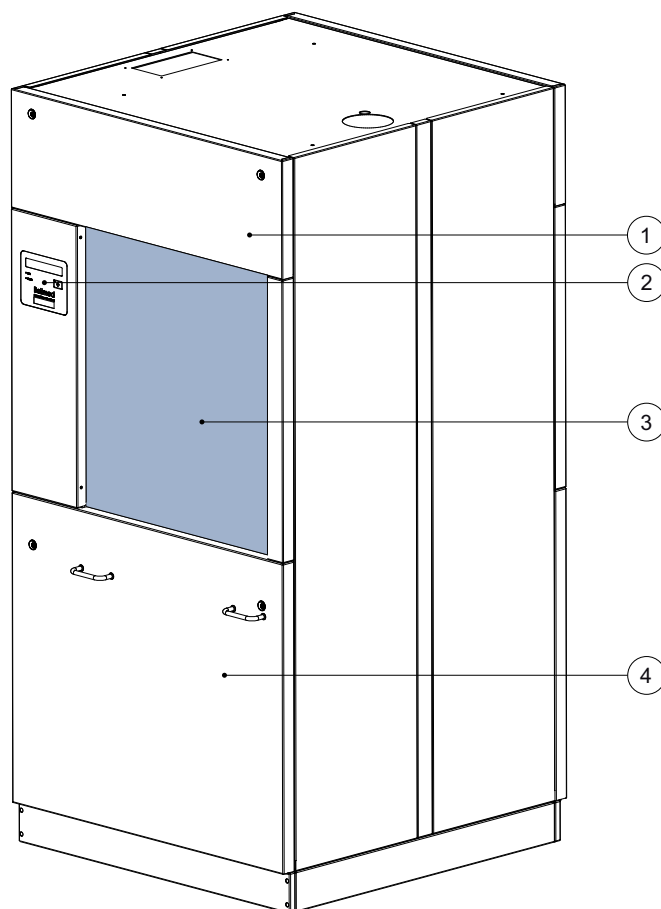


Fig 301

- 1 Door drive (behind the panel)
- 2 Operating unit with door button
- 3 Washing chamber door made of double-layer safety glass
- 4 Service panel

### 5.3 Electro drawer with PCBs

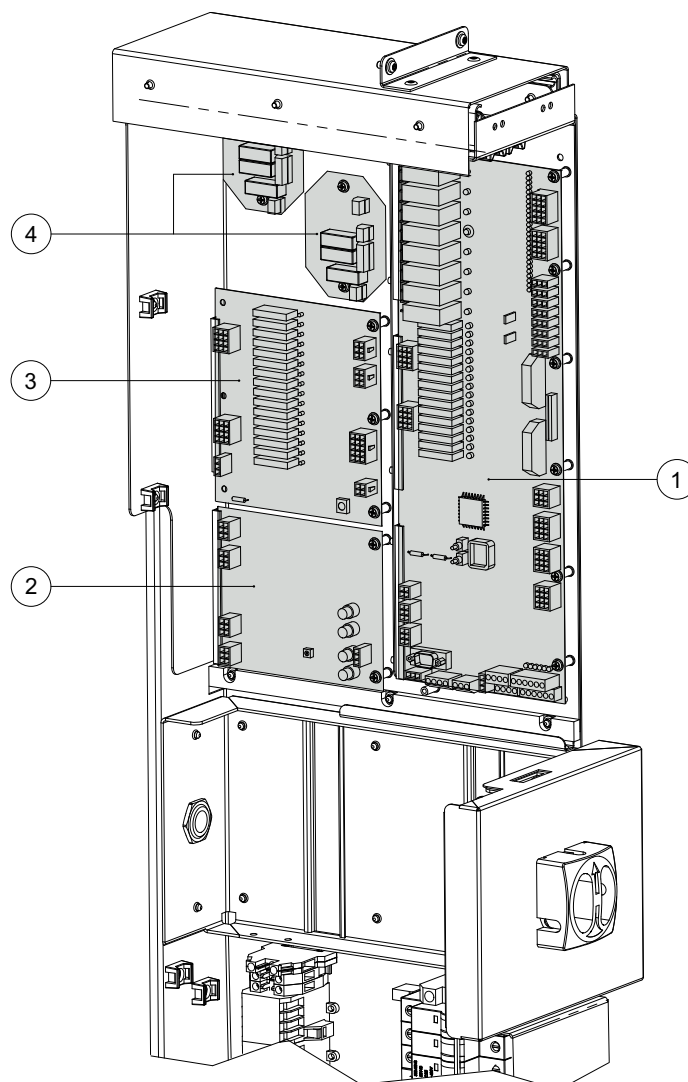


Fig 241

- 1 Processor PCB ECU 2000
- 2 Linear drive Door Contact Pressure PCB
- 3 Interface PCB
- 4 Door switch relay

## 5.4 Operating unit loading side (LS)

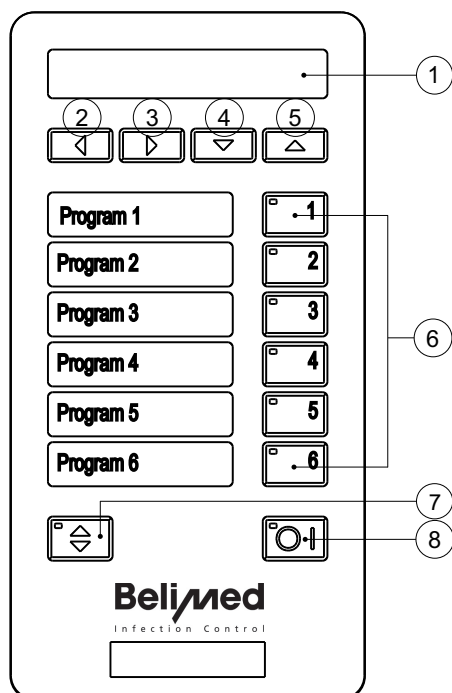


Fig 179

- 1) **Display**
  - With screensaver **"BELIMED INFECTION CONTROL"**; display appears automatically after 1 h. Press any button, display **"Program ready"** appears again
- 2) **Cursor key left**
  - Print operating data such as program recipe and setup parameters
  - Self-disinfection On/Off
  - IPD verification On/Off
- 3) **Cursor key right**
  - Acoustic signal On/Off
- 4) **Cursor key down**
  - Printer On/Off
- 5) **Cursor key up**
  - Shift button Programs P7 - P12
- 6) **Program buttons**
  - Selection of Programs P1 - P6, with Shift P7 - P12
- 7) **Door button**
  - Open/close door
- 8) **On/Off button**
  - Display batch number (press 4 seconds)

## 5.5 Operating unit unloading side (US)

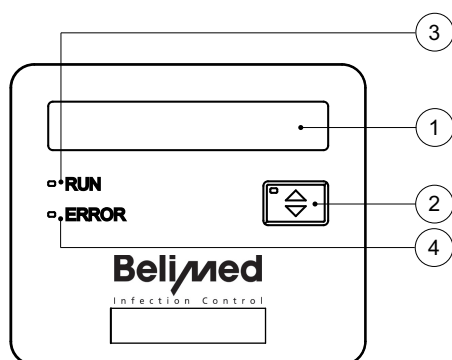


Fig 178

- 1) **Display**
  - With screensaver **"BELIMED INFECTION CONTROL"**; display appears automatically after 1 h. Press any button, display **"Program ready"** appears again
- 2) **Door button**
  - Open/close door
- 3) **RUN**
  - LED lit = in progress
- 4) **ERROR**
  - LED lit = error
  - (See Chap. 10 "Errors with program interruption and their elimination")

## 6 Service modules, software configuration

### 6.1 Access rights

| Specialised personnel         | Input modules                                                                                                          | Access       |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------|
| Detergent manufacturers       | Analysis Module; Dosing Module                                                                                         | Password A   |
| Hospital clinical technicians | Analysis Module; Dosing Module; Servo Control Module; Parameter Module; Configuration Module 1; Configuration Module 2 | Password B   |
| Belimed service technicians   | All modules                                                                                                            | Hardware key |

### 6.2 Accessing the Service Module

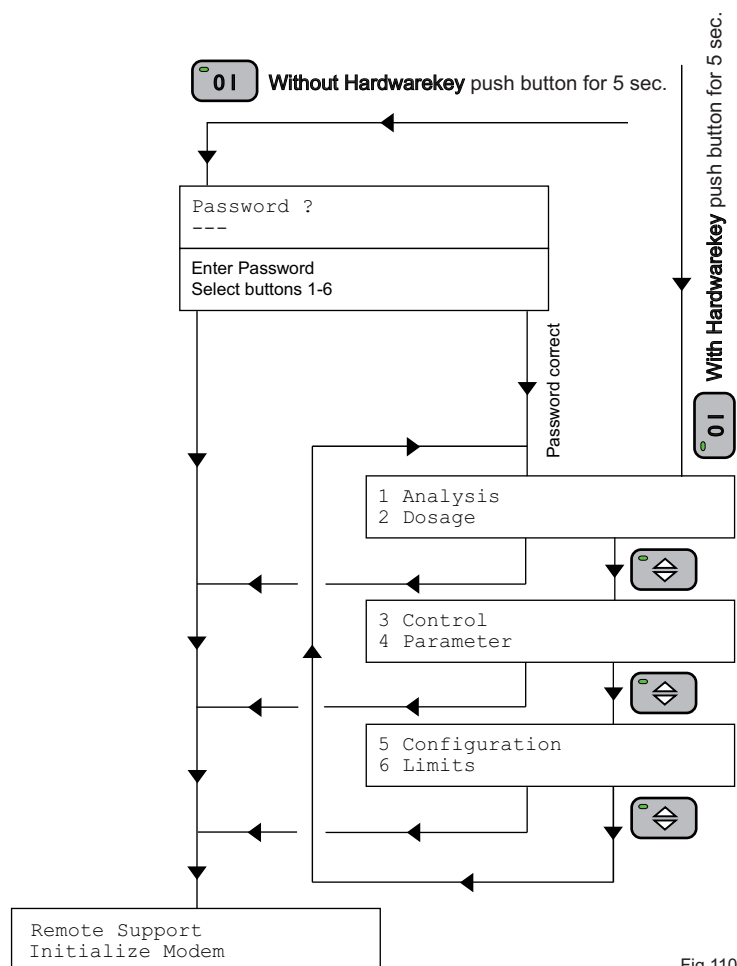


Fig 110

### 6.3 Operation within the input modules

- ▶ Press button  for 5 s
- ▶ Enter password
- ▶ Cursor functions using buttons     within the display

**Note**

The value is stored when leaving by means of the cursor.

- ▶ With button  to next module
- ▶ Exit or to higher level with button 

### 6.4 Simultaneous opening of both doors for servicing operations

**Warning**

Simultaneous opening of both doors is permitted for servicing operations only! Do not transfer washing utensils from loading to unloading side using this function!

**Procedure:**

- ▶ Display message "*Program ready*"
- ▶ Press button  LS for five seconds
- ▶ LS door opens
- ▶ Password request
- ▶ Keep pressing button  and enter password
- ▶ US door opens

## 6.5 Service modules overview

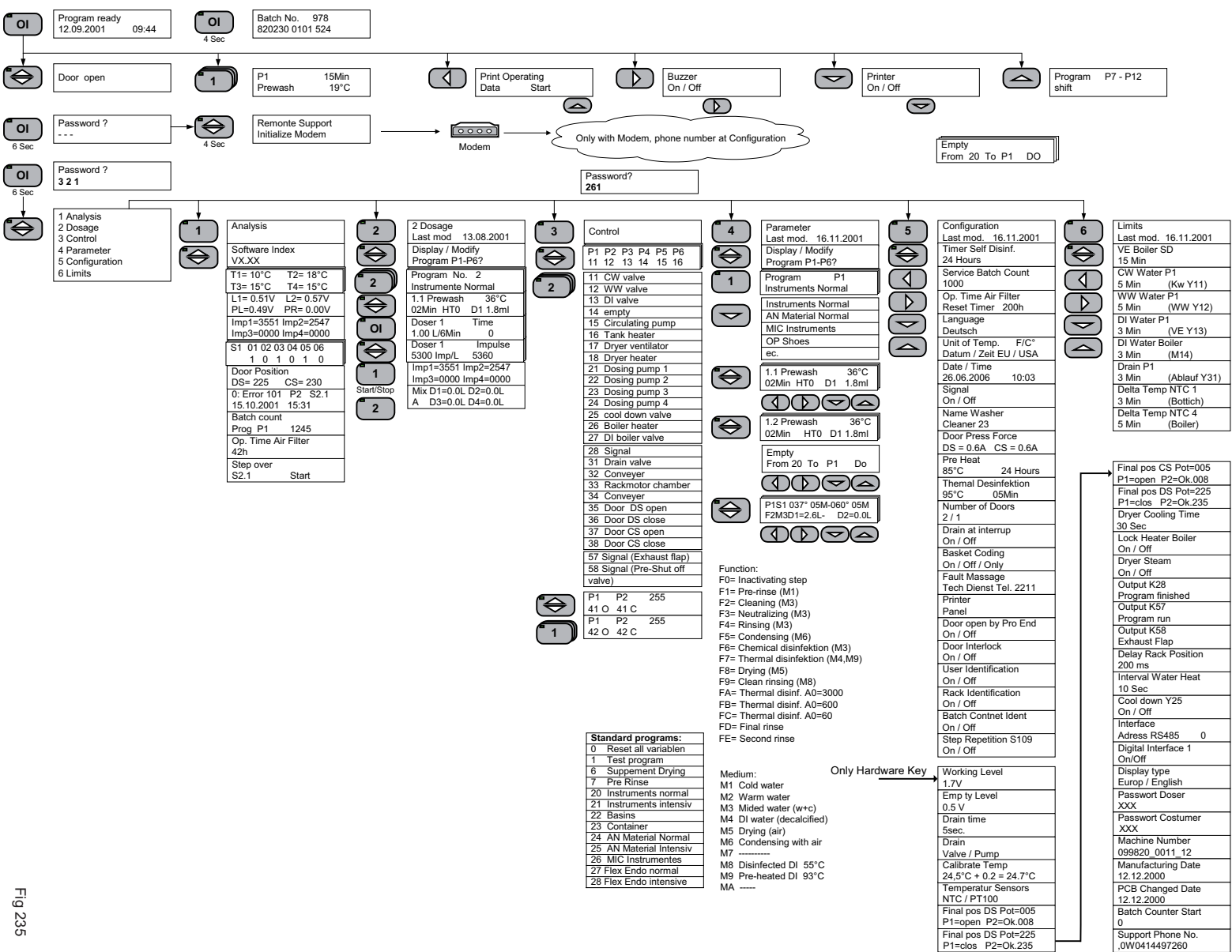


Fig. 235

## 6.6 Analysis module

The following operating status parameters can be analysed and diagnosed. **No entries possible!** In this module, queries can be processed while the machine is running.

The components are shown in the function diagram (see Chap. 3.6.7 "Electrical function diagram") and (Chap. 3.6.8 "Electrical function diagram with steam drying").

### 6.6.1 Starting the Analysis Module

| Function                                                                                         | Display message |
|--------------------------------------------------------------------------------------------------|-----------------|
| LED button  lit | Analysis        |

### 6.6.2 Software index

| Function                                                                                                                                                                                                                                                                                                                                                | Display message         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Display message flashes. This is true for all subsequent analysis steps. Press button  to change further.<br>Pressing button  stops current program and continues in analysis module. | Software index<br>VX.XX |

### 6.6.3 Current values of temperature sensors 1-4

| Function                                                                                                                                                                                                | Display message                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| NTC1 = washing chamber<br>NTC2 = dryer<br>NTC3 = empty<br>NTC4 = DI boiler<br>Further information:<br>(see Chap. 6.11.6 "Calibrating the temperature sensors"<br>6.11.7 "Temperature sensor allocation" | T1=45.2°C T2=45.0°C<br>T3=30.1°C T4=85.8°C |

### 6.6.4 Current values of Temperature Sensors 5+6

| Function                                                                                                                                                                                                    | Display message     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| NTC5 = Washing Chamber Monitoring Sensor<br>NTC6 = DI Boiler Monitoring Sensor<br>Further information:<br>(see Chap. 6.11.6 "Calibrating the temperature sensors"<br>6.11.7 "Temperature sensor allocation" | T5=45.3°C T6=85.2°C |

### 6.6.5 Current values of level sensors

| Function                                                                                                                                                                                                                                                                                                                                                                                                | Display message                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| L1 (Level 1) and L2 (Level 2) are current values of level sensors. Operating level approx. 1.7 V; empty level approx. 0.5 V.<br>PL (pressure left) and PR (pressure right) are current values of the pressure sensors.<br>Further information:<br>(see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)")<br>(Chap. 6.11.2 "Circulation pump operating level")<br>(Chap. 6.11.3 "Entering the empty level") | L1=1.20V L2=1.02V<br>PL=0.00V PR=0.00V |

### 6.6.6 Current values of flow meter

| Function                                    | Display message                        |
|---------------------------------------------|----------------------------------------|
| Impulses<br>(see Chap. 6.7 "Dosing module") | Imp=3551 Imp=2547<br>Imp=0000 Imp=0000 |

### 6.6.7 Input switching statuses S101-S106

| Function                                                                                                                                                                                                                                              | Display message                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| S101 = automatic program recognition<br>S102 = automatic program recognition<br>S103 = automatic program recognition<br>S104 = external reset / close US door (automatic)<br>S105 = T rack positioning/test<br>S106 = D automatic program recognition | S1 01 02 03 04 05 06<br>1 0 1 0 1 0 |

### 6.6.8 Input switching statuses S107-S112

| Function                                                                                                                                                                                                                                               | Display message                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| S107 = E automatic program recognition<br>S108 = F automatic program recognition<br>S109 = pressure switch for clogged screen (opener)<br>S110 = LS door auxiliary relay closed<br>S111 = US door auxiliary relay closed<br>S112 = LS door switch open | S1 07 08 09 10 11 12<br>1 0 0 1 0 1 |

### 6.6.9 Input switching status S113

| Function                     | Display message |
|------------------------------|-----------------|
| S113 = US door switch closed | S1 13<br>1      |

### 6.6.10 Input switching statuses S201-206

| Function                                       | Display message      |
|------------------------------------------------|----------------------|
| S201 = Empty Level Indicator 1                 | S2 01 02 03 04 05 06 |
| S202 = Empty Level Indicator 2                 | 1 1 1 1 1 1          |
| S203 = Empty Level Indicator 3                 |                      |
| S204 = Empty Level Indicator 4                 |                      |
| S205 = Empty Level Indicator 5                 |                      |
| S206 = automatic loading and unloading station |                      |

### 6.6.11 Input switching statuses S207-212

| Function                                       | Display message      |
|------------------------------------------------|----------------------|
| S207 = full automation manually (code)         | S2 07 08 09 10 11 12 |
| S208 = full automation automatically           | 0 1 0 1 0 1          |
| S209 = safety switch actuator DS               |                      |
| S210 = safety switch actuator US               |                      |
| S211 = pressure switch 50 mbar                 |                      |
| S212 = differential pressure switch for filter |                      |

### 6.6.12 Input switching status S213

| Function                         | Display message |
|----------------------------------|-----------------|
| S213 = error in exhaust facility | S2 13           |
|                                  | 0               |

### 6.6.13 Input switching statuses Interface PCB S301-S306

| Function   | Display message      |
|------------|----------------------|
| S301-S306s | S3 01 02 03 04 05 06 |
|            | 0 0 0 0 0 0          |

### 6.6.14 Input switching statuses Interface PCB S307-S312

| Function  | Display message      |
|-----------|----------------------|
| S307-S312 | S3 07 08 09 10 11 12 |
|           | 0 0 0 0 0 0          |

### 6.6.15 Input switching statuses Interface PCB S313

| Function | Display message |
|----------|-----------------|
| S313     | S3 13           |
|          | 0               |

### 6.6.16 Input switching statuses SA to SF

| Function                                                                                                                                                        | Display message                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| SA = Load shut-off (building)<br>SB = Floor pan leak indicator<br>SC = DI boiler code<br>SD = DI boiler float switch<br>SE = Open LS door<br>SF = Close US door | SA SB SC SD SE SF<br>0 0 1 1 0 0 |

### 6.6.17 Door position

| Function                                     | Display message                |
|----------------------------------------------|--------------------------------|
| Door positions on loading and unloading side | Door Position<br>DS=225 CS=230 |

### 6.6.18 Last ten errors

| Function                                                                                                                                                                                                                                                                                          | Display message                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Display with error code, program number, program step, date and time of error. Switch between entries using buttons  and  . | 0: Error111 P3 S2.1<br>13.12.2000 16:44 |

### 6.6.19 Batch number for programs 1-12

| Function                                                                                                                                                                                                           | Display message           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Switch between entries using buttons  and  . | Batch count<br>Prog P1 52 |

### 6.6.20 Hours of operation of air filter

| Function                                                                                                                                                      | Display message             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| The time corresponds to the cumulative sum of drying times.<br><b>Replace air filter after every 500 hours of operation!</b> (see Chap.12.14 "Drying system") | Op. Time Air Filter<br>42 h |

### 6.6.21 Skipping steps

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Selection of programs P1-P6 using buttons  to  (shift  - to  for programs P7-P12).<br>Program steps are displayed -> Switch between entries using buttons  and  -> When cursor is on "Start", start using button  . | Step over<br>Program P1-P6 ?<br><br>Step over<br>S2.1                      Start               |
| <b>Display with current doser</b><br>When starting a program step, the current doser, the dosage quantity, target temperature and program time appear on the display. This display alternates with the operational status display.<br>Halt the program using button  -> LS door opens -> Take water sample -> Close door using button  -> Program continues.<br>The dosage quantity is calculated from the effective amount of water, the target concentration and the calibration factor.                                                                                                                                               | Step over    D1=124ml<br>S2.1   M4   095°C   10min<br><br>P1    _____    13min<br>Wash<br>36°C |

## 6.7 Dosing module

This module serves to query and calibrate the dosage.

### 6.7.1 Starting the Dosing Module

| Function                                                                                                                       | Display message                     |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Date of last modification. LED button  lit. | Dosage<br><br>Last mod.   13.5.2006 |

### 6.7.2 Display / Modify

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Display message                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Selection of programs P1-P6 using buttons  to  (shift  - to  for programs P7-P12). Dosage entry can be omitted.<br>Display "Calibrate flow meter" (see also Chap.6.7.6 "Calibrating Flow Meters 1-4"). | Display/Modify<br>Program P1-P6 ? |

### 6.7.3 Program number and name

| Function                                                                                                                 | Display message                                           |
|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Viewing program steps using button  . | Program                      P4<br><br>Instruments Normal |

### 6.7.4 Program steps

| Function                                                                                                                                                                                                                                                                                                                                                                                                                | Display message                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Use button  to select the program steps.<br>The program step, temperature, total time of the program step, HT (holding time 0 or 1) as well as the doser and current dosing setting are displayed.<br>Only the dosing quantity can be modified here (see Chap. 6.9.4 "Entering recipes") and (Chap. 6.9.6 "Parameter entry overview"). | 1.1 Prewash      35°C<br>02min HT0      D1 1.2ml |

### 6.7.5 Calibrating Dosing Pumps 1-4



#### Caution

Only an intact and correctly serviced dosing system can ensure optimal cleaning (see Chap. 12.13 "Dosing system").

| Function                                                                                                                                                                                                                                                                                                                                                                | Display message                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Setting "time" with flow meters disconnected.<br>1.00 l/min = Start dosing pump for calibration using button  , dosing pump runs for 6 minutes -> Enter measured amount.<br>360 = time remaining (s)<br>Calibration procedure (see Chap. 6.7.9 "Calibrating the dosing pumps (Time)"). | Doser 1 Time<br>1.00 l/6min      360 |

### 6.7.6 Calibrating Flow Meters 1-4

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Display message                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Setting "Impulse" with flow meters connected.<br>5300 Imp/l = Start dosing pump for calibration using  , when one litre is reached -> stop using button  -> adopt impulse result using button  .<br>4500 = time remaining (s)<br>Calibrating procedure (see Chap. 6.7.10 "Calibrating the flow meters (impulses)"). | Doser 1 Impulse<br>5120 Imp/l      4500 |

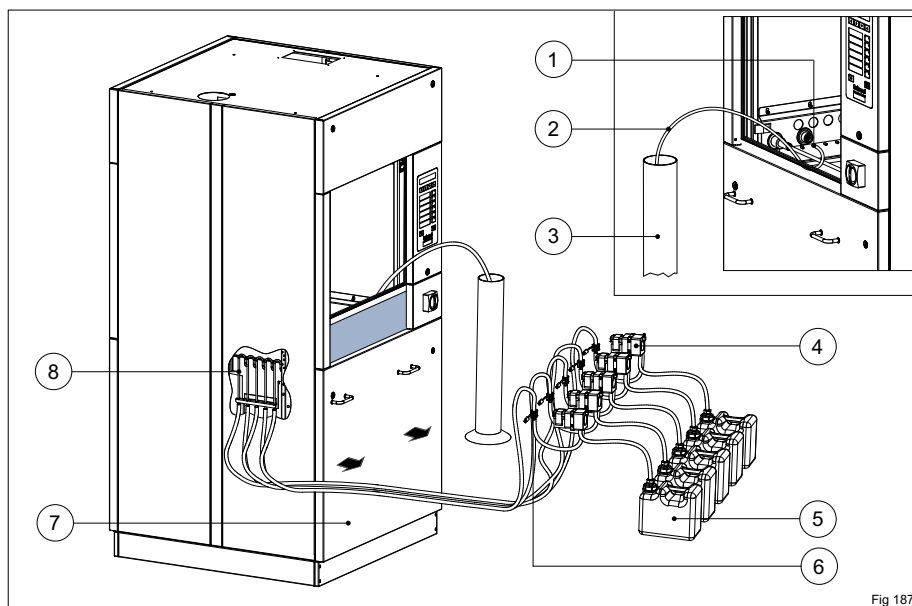
### 6.7.7 Flow meter - current values

| Function        | Display message                                |
|-----------------|------------------------------------------------|
| Stored impulses | Imp1=2142    Imp2=1578<br>Imp3= 831    Imp4= 0 |

### 6.7.8 MIX-Dosing

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Display message                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <p>Simultaneous dosing from several dosers.</p> <p>Programming:</p> <p><i>Without Mix-Dosing / Doser 1 = 2.6 ml/l</i></p> <p>Display message:</p> <p>P1S2_035°00M-060°05M</p> <p>F2M3_D1=2.6L-D1=0.0L</p> <p><i>With Mix-Dosing/A = D1= 5.0ml D2 = 3.0ml</i></p> <p>Display message:</p> <p>P1S2_035°00M-060°05M</p> <p>F2M3_DA=0.0L-D1=0.0L</p> <p>A maximum of 4 detergents per phase can be dosed simultaneously with corresponding concentration by means of Mix-Dosing. Mix-Dosing is activated when one of the letters "A-F" is entered with the doser. A maximum of four concentrations can be allocated to each letter.</p> <p><b>Note:</b></p> <p><i>The software activates a maximum of two dosers simultaneously (maximum safeguarding exceeded).</i></p> <p>Recommended dosage media (see Chap. 11.6 "Overview of ex-factory programs").</p> | <p>Mix D1=0.0L D2=0.0L</p> <p>A D3=0.0L D4=0.0L</p> |

### 6.7.9 Calibrating the dosing pumps (Time)



- 1 Calibrating tube (Nylflex) connector
- 2 Calibrating tube (Nylflex)
- 3 Measuring vessel
- 4 Dosing pumps (1-5 depending on outfit)
- 5 Containers for detergents
- 6 Flow meters (1-4 depending on outfit)
- 7 Lower front panel LS
- 8 Dosing intake (1-5 depending on outfit)



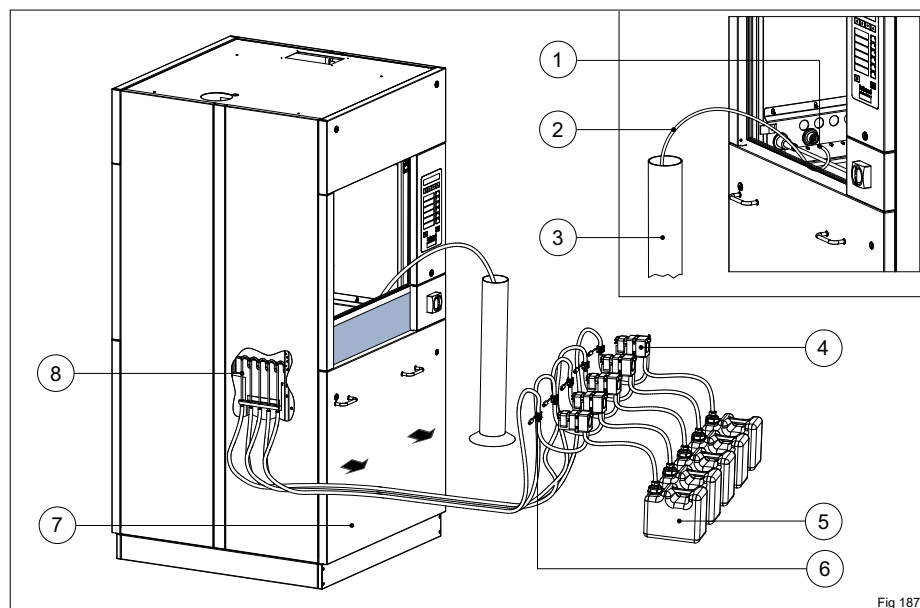
#### Warning

Wearing protective goggles and gloves is compulsory when handling detergents of any kind!

Detergent manufacturer safety instructions must always be followed!

- ▶ Open the door using button
- ▶ Mount calibrating tube (Fig. 187 Pos.2) to connector (Fig. 187 Pos.1) and place other end in measuring vessel (Fig. 187 Pos.3)
- ▶ Start calibration program using button . The dosing pump pumps the dosage medium into the calibrating container. The dosing pump shuts off automatically after 6 minutes.
- ▶ Enter measured volume (l/6min) (see Chap. 6.7 "Dosing module")
- ▶ Dismount calibrating tube
- ▶ Pour medium in measuring vessel back into container (Fig. 187 Pos.5)

### 6.7.10 Calibrating the flow meters (impulses)



- 1 Calibrating tube (Nylflex) connector
- 2 Calibrating tube (Nylflex)
- 3 Measuring vessel
- 4 Dosing pumps (1-5 depending on outfit)
- 5 Containers for detergents
- 6 Flow meters (1-4 depending on outfit)
- 7 Lower front panel LS
- 8 Dosing intake (1-5 depending on outfit)



#### Warning

Protective goggles and gloves are compulsory when handling detergents of any kind!

Detergent manufacturer safety instructions must always be followed!

- ▶ Open the door using button 
- ▶ Mount calibrating tube (Fig. 187 Pos.2) to connector (Fig. 187 Pos.1) and place other end in measuring vessel (Fig. 187 Pos.3).
- ▶ Start calibration program using button . The dosing pump pumps the dosage medium into the calibrating container.



#### Caution

The arrows on the flow meters must always point upwards!

- ▶ When 1 litre is reached in the measuring vessel, halt program using button .
- ▶ Adopt number of impulses measured using button 

(See Chap.3.3.4 "Dosing pump set with "empty" indicators and flow meter") and (Chap. 6.11.22 "Password for detergent manufacturers")

## 6.8 Control Module

This module serves for manual activation of individual electrical components.



### Warning

Direct activation exposes components to live electricity!

### 6.8.1 Starting the Control Module

| Function                                                                                          | Display message |
|---------------------------------------------------------------------------------------------------|-----------------|
| LED button  lit. | Control         |

### 6.8.2 Direct selection of Actuators K11-K16

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Display message                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| Selection of individual components using buttons  to  . If a relay is active, the corresponding LED on the button (K11-K16) is lit. Pressing once turns electrical component "On", pressing again turns component "Off". Components are activated for 10 s max.<br>Reset all activities with button  .<br><i>Door drive M35-M38 and linear motor M41, M42 are only active when the corresponding button is pressed.</i> | P1 P2 P3 P4 P5 P6<br>11 12 13 14 15 16 |

### 6.8.3 Direct activation Linear Drive (M41) LS



### Caution

When activated directly, the door may slide open to the stop position and the gear belt may jump over the belt pulley. **If this is the case, the door must be readjusted!**

| Function                                       | Display message          |
|------------------------------------------------|--------------------------|
| O = open, C = close, 215 = potentiometer value | P1 P2<br>41O 41C POT=215 |

### 6.8.4 Direct activation Linear Drive (M42) US

| Function                                       | Display message          |
|------------------------------------------------|--------------------------|
| O = open, C = close, 247 = potentiometer value | P1 P2<br>42O 42C POT=247 |

## 6.9 Parameter Module

This module serves for entering and adjusting process parameters.

### 6.9.1 Starting the Parameter Module

| Function                                                                                                                     | Display message                   |
|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Date of last modification. LED button  lit. | Parameter<br>Last mod. 16.05.2006 |

### 6.9.2 Selecting Programs P1-P6 (Shift P7-P12)

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Display message                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Select program  to  (Shift P7-P12) -> Select recipe (can be skipped using button  ) -> Program library.<br>(See Chap. 11.4 "Validated process parameters P1-P12")                                        | Display / Modify<br>Program P1-P6?      |
| <b>Program name allocation</b><br>Change program name using buttons  and  .<br>Name is displayed in batch print-out and batch documentation (see Chap. 7 "Batch print-out"). If "empty" appears, nothing is printed out.                                                                  | Program P1<br>Instruments Normal        |
| <b>Holding time</b><br>Enter temperature and time specification for each step. Utility and step allocation are not modified here (see Chap. 6.9.4 "Entering recipes").<br>HT (Holding time) program time is only measured if actual value exceeds target value. 1 = "On"; 0 = "Off"<br><b>Note:</b><br><i>Holding time 1 always applies in thermal and chemical disinfection (F6, F7 and FA). Holding time 0 applies in drying and condensing (M5, M6).</i> | 1.1 Prewash 00°C<br>00 min HT0 D1 1.5ml |

### 6.9.3 Allocation of the program library

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Display message           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Displays the selected program from the program library (see Chap. 6.9.5 "Program library (program labels)").<br>Press button  on "Do" and confirm using button  . After confirmation, "Ok" is displayed.<br>From 03 = program number<br>To P1 = allocated program button<br>Do  = execute<br>0 = delete all variables | Empty<br>From 03 To P1 Do |

### 6.9.4 Entering recipes

| Function                                                                                                                                                                                                                                                                                           | Display message                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Utilities M1 to MA (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").<br>Functions F0 to FF (see Chap. 6.9.15 "Function F0 - inactive step").<br>Three-digit temperature entries, temperature limit for Utilities 1-4 and 7-9 max. 99°C, Utilities 5+6 max. 130°C. Time entries max. 69 minutes. | P1S1 024°05M-060°05M<br>F2M3 D1=2.5L-D2=2.6L |

### 6.9.5 Program library (program labels)

| Program name          |                       |
|-----------------------|-----------------------|
| Test Program          | Container             |
| Supplemental drying   | AN Material Normal    |
| Pre Rinse             | AN Material Intensive |
| Instruments Normal    | MIS Instruments       |
| Instruments Intensive | Endoscopes Normal     |
| Basins                | Endoscopes intensive  |



#### Caution

Excessively long drying periods at high drying temperature will accelerate ageing of medical devices. Tubes become brittle and start leaking.

The user is responsible for all program modifications! Ex-factory programs have a thermal disinfection step, and processing of temperature-sensitive washing items is therefore not intended. Correct dosing pump function and allocation of chemicals must be ensured. Every program must be validated when taken into operation.



#### Warning

Washing items must not be allowed to pass into the clean work area without going through washing and disinfection! It must be ensured that the complete program cycle has been run through without errors.

### 6.9.6 Parameter entry overview

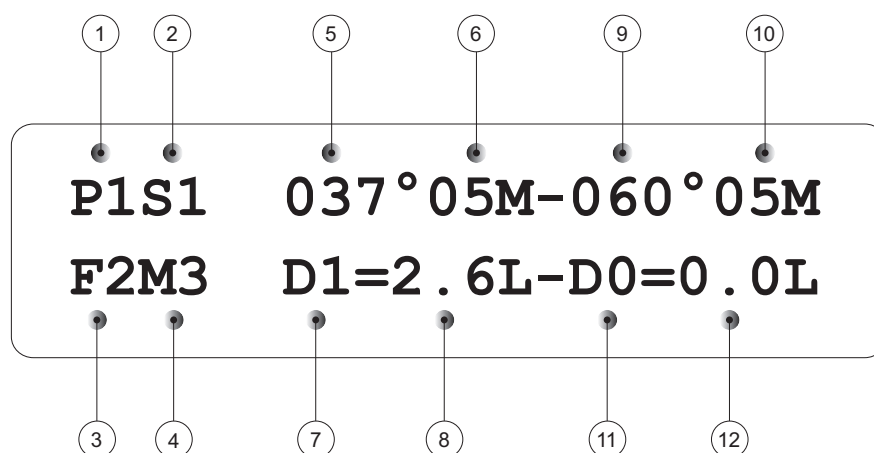


Fig 117

- 1 Program Number P1-P12
- 2 Schritt 1-9
- 3 Function F
- 4 Utility M
- 5 Temperature for Step Phase 1: M1-4+M7 = 0-99° / M5, M6, M9=0-130°C
- 6 Time for Step Phase 1: 0-69 min
- 7 Dosing system for Step Phase 1: Dosers 1-5 / A-F
- 8 Dosing quantity for Step Phase 1: 0.0-9.9 ml/l
- 9 Temperature for Step Phase 2: 0-130°C
- 10 Time for Step Phase 2: 0-69
- 11 Dosing system for Step Phase 2: Dosers 1-5 / A-F
- 12 Dosing quantity for Step Phase 2: 0.0-9.9 ml/l

| Function F                                             | Utility M                                                   |
|--------------------------------------------------------|-------------------------------------------------------------|
| F0 = step inactive                                     | M1 = cold water                                             |
| F1 = Pre Rinse (M1)                                    | M2 = Warm water                                             |
| F2 = Wash (M3)                                         | M3 = Mixed water (warm+cold)                                |
| F3 = Neutralise (M1, M2)                               | M4 = DI water (fully de-ionised)                            |
| F4 = Rinse (M1, M2)                                    | M5 = Dry (air)                                              |
| F5 = Condense (M6)                                     | M6 = Dry, Condense Exhaust Air                              |
| F6 = Chemical Disinfection (M4, M9)                    | M8 = Disinfected DI Water (Boiler 55 °C only for endoscopy) |
| F7 = Thermal Disinfection (M4, M9)                     | M9 = Pre-heated DI Water (Boiler 95 °C)                     |
| F8 = Dry (M5, M6)                                      | MA = Preceding Utility                                      |
| F9 = Clean Rinsing (M4) conductivity system            |                                                             |
| FA = Thermal Disinfection A <sub>0</sub> 3000 (M4, M9) |                                                             |
| FB = Thermal Disinfection A <sub>0</sub> 600 (M4, M9)  |                                                             |
| FC = Thermal Disinfection A <sub>0</sub> 60 (M4, M9)   |                                                             |
| FD = Final Rinse (M4, M8, M9)                          |                                                             |
| FE = Second Rinse (M2, M4)                             |                                                             |
| FF = Measuring rinse (not available)                   |                                                             |

### 6.9.7 Utility M1 Cold Water Step (CW)

#### Dynamic filling procedure (minimal water consumption)

Consumption of water and chemicals is reduced to a minimum. The quantity of water needed for optimum operation of the circulation pump is filled in by the controller and is replenished as appropriate for the respective rack and load.

#### CW Step:

- ▶ Water is filled in by the device up to the calibration point (Fig. 228 Pos.1)  
 Calibrating procedure: The filling quantity (l/s) is calculated from the opening time of the intake valve until the calibration point is reached (Fig. 228 Pos.6). The calibration point corresponds to the specified quantity of water.
- ▶ Circulation pump switches on (Fig. 228 Pos.4)
- ▶ Level drops
- ▶ Dynamic filling procedure starts. The filling procedure is terminated when the operating level is reached (Fig. 228 Pos.5).
- ▶ The controller calculates the quantity of water filled in.
- ▶ The system checks after approx. 7 s, whether the specified value of 1.7 Volts has been reached

If 1.7 Volts (Fig. 228 Pos.2) has not been reached, additional water is filled in. When the limit (5 minutes) is exceeded, Error Message 141 "no cold water" (see Chap. 10.3 "Error display / error code table / cause and remedy").

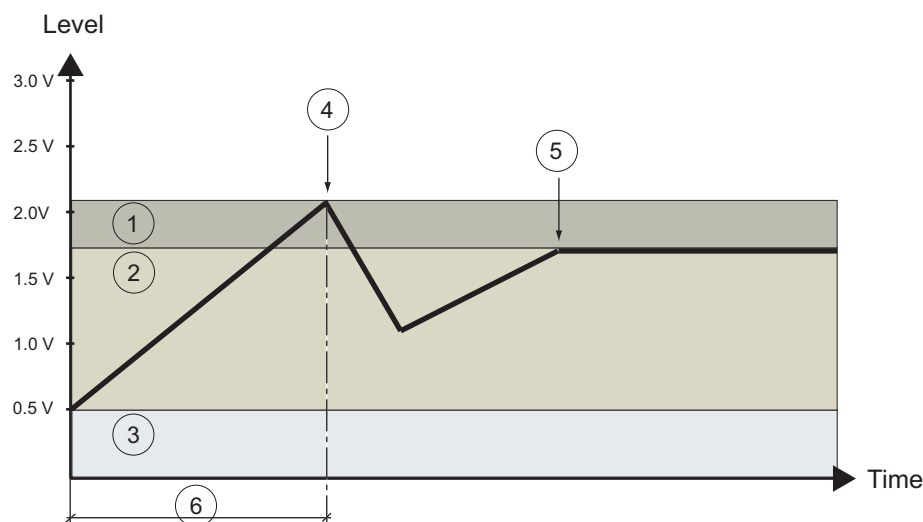


Fig 228

- 1 Calibration point 2.1 Volts
- 2 Operating level 1.7 Volts
- 3 Empty level 0.5 Volt
- 4 Pump switches on (corresponds to uniform quantity of water; time to calibration point 2.1V is stored)
- 5 Operating level reached
- 6 Depending on the filling rate (l/sec)



#### Note

Water consumption in the respective water step is calculated from the valve opening time - relevant for dosing.

Limit modifications (see Chap. 6.12 "Error threshold values (Limits Module)").

Further information:

(See Chap. 6.9.10 "Utility M4 DI Water Step")

(Chap. 6.11.2 "Circulation pump operating level")

(Chap. 6.11.3 "Entering the empty level")

### Temperature control

- Monitoring starts with heating up
- A max. of 45°C is permissible for F1 "Pre Rinse". If this water temperature is exceeded, the process is stopped with Error Code 163 "Water too Hot".
- If the target temperature is not reached, the software stops the process with Error Code 161 "No heat".

### Dosing procedure

- 1) Dosing of the additives is calculated by means of the calibrating procedure and can be added at the start after the target temperature is reached.
- 2) Dosing can be controlled via the dosing pump or the flow meter (see Chap. 6.7.10 "Calibrating the flow meters (impulses)").

Example 1:

|       | Phase 1-   | Phase 2   |                                         |
|-------|------------|-----------|-----------------------------------------|
| P1S1_ | 035°00M-   | 060°05M   | Phase 1: Filling at 35°C, dosing 2.6 ml |
| F1M3_ | D1 = 2.6L- | D1 = 0.0L | Phase 2: Heating up to 60°C             |

Example 2:

|       | Phase 1-   | Phase 2   |                                          |
|-------|------------|-----------|------------------------------------------|
| P1S1_ | 035°00M-   | 060°05M   | Phase 1: Filling without dosing          |
| F1M3_ | D1 = 0.0L- | D1 = 5.0L | Phase 2: Heating up to 60°C, dosing 5 ml |



#### Note

If dosing is entered together with a temperature in the first program phase, dosing is carried out only after the target temperature has been reached.

## 6.9.8 Utility M2 Warm Water Step (WW)

Same functions as in Cold Water Step (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").



#### Note

If no temperature is programmed (00), the program starts with the present temperature of the warm water.

## 6.9.9 Utility M3 Mixed Water Step (CW+WW)

Same functions as in Cold Water Step (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").

During the dynamic filling procedure, cold and warm water are filled in up to the specified temperature. WW is added first, and after the target temperature is reached, CW is added.

**Note**

If temperature drops below target, WW is added.

### 6.9.10 Utility M4 DI Water Step

Same functions as in Cold Water Step (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").

### 6.9.11 Utility M5 Drying

Ventilator (Outlet K17) and dryer heater (K18) are controlled by means of air temperature sensor input (NTC2). Temperature indicated on display or printer corresponds to air temperature sensor (NTC2) at tub intake (see Chap. 6.10.14 "Pumping off in the event of programm interruption").

**Note**

A fixed lag is always programmed for the ventilator (see Chap. 6.11.12 "Drying lag time").

### 6.9.12 Condenser M6 functions

In order to activate the condenser, Utility M6 "*Condense*" must be programmed instead of M5 "*Dry*". In this medium, the CW valve (Y27) is opened for drying. After 8 minutes of drying, the CW valve remains closed, as the exhaust air humidity drops below 20%.

### 6.9.13 Pre-heated DI water M9 (Final Rinse)

Enter M9 instead of M4 for Final Rinse.

**Note**

Preferably enter Holding-Temperature 95°C, 0 minutes for the thermal disinfection temperature of the DI Tank. This reduces the heating up of the Final Rinse water in the washing chamber.

Content can be kept at the desired pre-heating temperature for e.g. 24 hours. When no program is selected, the temperature of the water tank drops after the preset time has elapsed (economy mode).

Setup functions:

(See Chap. 6.10.11 "Pre-heating temperature / holding time DI boiler" (Chap. 6.10.12 "Disinfection temperature / disinfection time DI boiler") (Chap. 6.11.13 "DI Boiler heater interlock with tank heater") (Chap. 8.2.3 "SC DI boiler code")

Filling procedure corresponds to the same functions as in Cold Water Step (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").

**Note**

When programming condenser DI water pre-heating (optional), Utilities M6 and M9 must always be included in the same program. If this is not the case, the DI water runs via the overflow into the drain.

### 6.9.14 Utility MA (1 step with 4 or more phases)

An unspecified number of temperature holding points and dosages can be programmed. Washing with a complex heating-up slope is possible

Example:

|      | Phase 1-   | Phase 2   |                                                                                                |
|------|------------|-----------|------------------------------------------------------------------------------------------------|
| P1S1 | 035°00M-   | 060°05M   | Filling at 35 °C -> Dosing 2.6 ml -> Heating up to 60 °C -> Holding time 5 min-> Dosing 1.0 ml |
| F2M3 | D1 = 2.6L- | D2 = 1.0L |                                                                                                |

Because Utility MA has been selected: No emptying and refilling.

|       | Phase 3-   | Phase 4   |                                                                                       |
|-------|------------|-----------|---------------------------------------------------------------------------------------|
| P1S2_ | 070°03M-   | 080°05M   | Heating up to 70 °C -> Holding time 3 min -> Heating up to 80 °C ->Holding time 5 min |
| F2MA  | D1 = 0.0L- | D1 = 0.0L |                                                                                       |



#### Note

F2 is automatically inserted when MA is selected. This can be changed manually if necessary.

### 6.9.15 Function F0 - inactive step

A step can be switched on or off. If for example two clean rinsing steps have been programmed, one of them can be deactivated with F0 in spite of being programmed with various parameters.



#### Warning

Do not set programs inactive. Programs that are not used must be deleted completely! There is the risk of an unwanted program being selected with "Automatic Program Recognition" (see Chap. 11.4.1 "Deleting programs").

### 6.9.16 Function F1 - Pre Rinsing

A maximum water temperature of 45 °C is permissible for this function. If this limit is exceeded, Error Code 163 "Water too Hot" is displayed and the process is stopped.



#### Note

Temperatures above 45 °C can lead to protein coagulation during the rinsing phase. Query S109 is only active in F1 (see Chap. 6.10.24 "Step Repetition (Foam control)").

### 6.9.17 Functions F2-F5, F8, FD, FE

These are only display functions. Holding time is set to 0.

Only use M4 and M9 together with F9.

### 6.9.18 Function F9 Clean Rinsing (optional IPD)

After the neutralising step, rinsing with DI water is carried out. The step "Clean Rinsing F9" should be repeated until the required conductivity value is reached. Water is drained off and the step is restarted. This procedure is repeated for a max. of 4 times. The number of repetitions can be set in the service program "CAST for IPD" (see Chap. 3.3.6 "Independent content documentation system (IPD)"). In the following step, "thermal disinfection" can be selected for example.

### 6.9.19 Functions F6+F7 - thermal or chemical disinfection

In both display functions, holding time is set at 1 (see Chap. 6.10.11 "Pre-heating temperature / holding time DI boiler").

### 6.9.20 Function FA - thermal disinfection A<sub>0</sub>=3000

A<sub>0</sub> = germ destruction comparable to procedures using moist heat.

The action time for thermal disinfection can be shortened using Function FA. The device continuously measures and sums up the heat quantities during heating-up time and terminates the phase when the required A<sub>0</sub>-Value 3000 has been reached.

Equation:

$$A_0 = \sum \left( 10^{(T-80)/Z} \right) \Delta t \rightarrow (Z=10, \Delta t=10 \text{ Sec above } 65^\circ\text{C})$$

Fig 210

#### Selection of A<sub>0</sub>-Values in practice

Definition:

*"Reduction of the number of living microorganisms on a product to a pre-specified level, which is appropriate for the subsequent utilization of the product".*

Reduction factor values of mostly 4 or 5 logarithmic steps are required of dosage media, depending on the type of germ.

- Disinfect containers for human excretions at minimum with A<sub>0</sub>-Value=60
- Disinfect surgical instruments at minimum with A<sub>0</sub>-Value=600

According to standard requirements, disinfection with A<sub>0</sub>-Value=3000 must be possible. However, the application is not defined.



#### Note

We recommend disinfection with A<sub>0</sub>-Value=3000 of all semi-critical instruments which require thermal disinfection but need not be sterilised subsequently.

**Example 1:**

```
P1S4_93°00M-093°01M  
FAM4_D1=0.0L-D3=2.6L
```

After reaching the  $A_0$ -Value=3000 in the first phase, the second phase follows (disinfection for 1 min at 93°C).

**Example 2:**

```
P1S4_93°05M-000°00M  
FAM4_D1=0.0L-D0=0.0L
```

After reaching the  $A_0$ -Value=3000 in the first phase, disinfection is continued for a further 5 minutes.

The current  $A_0$ -Value is continually shown on the display.

**6.9.21 Function FB - thermal disinfection  $A_0=600$** 

The same functions (see Chap. 6.9.20 "Function FA - thermal disinfection  $A_0=3000$ "), but with  $A_0$ -Value=600. All instruments which are sterilised after disinfection in the WD can be disinfected with  $A_0$ -Value=600. This corresponds to 60 s at 90°C or 10 minute at 80 °C

**6.9.22 Function FC - thermal disinfection  $A_0=60$** 

The same functions (see Chap. 6.9.20 "Function FA - thermal disinfection  $A_0=3000$ "), but with  $A_0$ -Value=60. This corresponds to 6 s at 90°C or 1 minute at 80 °C.

**6.9.23 Functions FD, FE and FF**

FD = Final Rinse

FE = Second Rinse

FF = Measuring Rinse

## 6.10 Configuration Module 1

Configuration 1 of the Setup Settings

### 6.10.1 Starting the Configuration Module

| Function                                                                                                                                                                          | Display message                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Accessible without hardware key. Includes date of last modification.<br>LED Program Button  lit. | Configuration<br>Last mod. 16.05.2006 |

### 6.10.2 Setting the self-disinfection timer

| Function                                                                                                                                                                                                                                                                                                                                                | Display message                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Time between last program cycle and self-disinfection prompting (see Chap. 11.3 "Why self-disinfection?").<br>Settings range 1-99 hours, 0 = inactive, default setting = 24 h<br><b>Caution!</b><br>For active self-disinfection, the entry in Mode " <i>Basket Coding</i> " must be on " <i>On</i> " (see Chap. 6.10.16 "Automatic rack recognition"). | Timer Self Disinf.<br>24 Hours |

### 6.10.3 Maintenance (batch number)

| Function                                                                                                                                                                                                                                                                                                                                                                                | Display message             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Upon reaching the specified number of hours of operation of the ventilator, " <i>Periodical Service</i> " appears instead of " <i>Program ready</i> ". The device can still continue operating.<br>00 = Maintenance display is switched off.<br>Following maintenance, the number must be increased by the respective number of batches (see Chap. 6.11.27 "Batch counter adjustment"). | Service Batch Count<br>1000 |

### 6.10.4 Ventilator operating hours (cumulative sum of drying time)

| Function                                                                                                                                                              | Display message                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| After replacing the air filter, set the hours of operation to zero using button  . | Op. Time Air Filter<br>Reset Timer 200 h |

### 6.10.5 Language

| Function                                                                                                                                                                                                                | Display message     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Switching to other language using buttons  and  . | Language<br>English |

### 6.10.6 Units

| Function                                                                                                                                                                                                                                                                                                            | Display message                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Temperature unit °C (Celsius) or F (Fahrenheit). Date and time displayed in European or American standard format.<br>Switch using buttons  and  . | Unit of Temp.       °C<br>Date/Time       Europ |

### 6.10.7 Date / time

| Function              | Display message                                                                |
|-----------------------|--------------------------------------------------------------------------------|
| Setting date and time | Date/Time<br>28.06.2006       16:24<br><br>Date/Time<br>06/28/2006    PM 04:24 |

### 6.10.8 Signal K28

| Function                                                                                                                                                                                                                                                                                                                               | Display message  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Switching the signal output (K28) (potential-free output) on or off.<br>Switch using buttons  and  (see Chap. 6.11.15 "Potential-free output K28, K57 and K58"). | Signal<br>On/Off |

### 6.10.9 Machine label

| Function                                                                                                         | Display message                 |
|------------------------------------------------------------------------------------------------------------------|---------------------------------|
| For batch printer or PC-documentation (see Chap. 7.1 "Program operation batch print-out (batch documentation)"). | Name Washer<br>Substeri Decont1 |

### 6.10.10 Entering door contact pressure

| Function                                                                   | Display message                     |
|----------------------------------------------------------------------------|-------------------------------------|
| Default setting = 0.6 A<br>Values for door press force 0-0.9 A for LS + US | Door Press Force<br>US=0.6A CS=0.6A |



#### Caution

Increase door press force in steps of 0.1A only! Subsequently recalibrate doors (see Chap. 6.11.8 "LS door frame final position when doors are open").

### 6.10.11 Pre-heating temperature / holding time DI boiler

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Display message                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <p>Setting the pre-heating temperature and the corresponding holding time. The DI boiler is temporarily kept up to temperature. The pre-heating time is only active outside of a program when the device is switched on. It starts afresh after correct completion of a program cycle. If the switch (code) of the DI boiler is switched off, this function is deactivated (see Chap. 8.2.3 "SC DI boiler code").</p> <p>Temperature range: 65°C to 95°C</p> <p>Holding time: 0-99 hours</p> | <p>Pre Heat</p> <p>85°C 24 Hours</p> |

### 6.10.12 Disinfection temperature / disinfection time DI boiler

| Function                                                                                                                                                                                                                                                                                                               | Display message                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <p>Heating up to a pre-set disinfection temperature takes place only after the program has started. The program ensures that the specified disinfection time is observed. If 0 minutes is set, the DI boiler is emptied even if the target temperature has not been reached.</p> <p>Default setting = 95°C / 0 min</p> | <p>Thermal Disinfection</p> <p>95°C 05min</p> |

### 6.10.13 Door configuration

| Function                                                                                       | Display message                   |
|------------------------------------------------------------------------------------------------|-----------------------------------|
| <p>One-door / two-door setting In the one-door version, the unloading side is not queried.</p> | <p>Number of Doors</p> <p>2/1</p> |

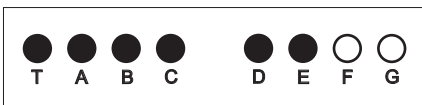
### 6.10.14 Pumping off in the event of programm interruption

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display message                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <p><b>On:</b> Pumping off is always activated in the event of program interruption.</p> <p><b>Off:</b> Pumping off is not activated in the event of program interruption. The circulation pump is activated again upon program restart without pumping off.</p> <p><b>Exception!</b></p> <p>If the first program step is M5 or M6, the entry is ignored.</p> <p><b>Caution!</b></p> <p>When a step is skipped (see Chap. 6.6.21 "Skipping steps") it must not be set to "On".</p> | <p>Drain at Interrupt</p> <p>On/Off</p> |

### 6.10.15 Suppressing drainage of washing liquid according to applicable laws for protection against infectious diseases

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Display message                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <p>No pumping off in the event of program interruption.</p> <p>According to §18 of the German Law for Protection against Infectious Diseases, a special program is required in the event of an epidemic. The disinfection phase must be at the beginning of the program. The first discharge of washing liquid must not take place before termination of the disinfection phase. If the program is interrupted, the procedure must not be continued with discharge of the washing liquid before the disinfection phase has been completed. This prevents contaminated washing liquid from entering the waste water.</p> <p>In the event of an epidemic, the door interlock (see Chap. 6.10.20 "Door Interlock LS") must be set as "On" and pumping off in the event of interruption (see Chap. 6.10.14 "Pumping off in the event of program interruption") must be set as "Off".</p> <p><b>On:</b></p> <p>Pumping off is always carried out in the event of program interruption (normal state)</p> <p><b>Off:</b></p> <p>Pumping off is not activated in the event of program interruption. If a program is then started, the circulation pump starts subsequently without pumping off.</p> <p><b>Exception!</b></p> <p>If the first program step is M5 or M6, the entry is ignored.</p> | <p>Drain at Interrupt</p> <p>On/Off</p> |

## 6.10.16 Automatic rack recognition

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Display message |          |          |          |          |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|----------|----------|----------|----------|----------|----|---|---|--|--|--|--|----|---|---|---|--|--|--|----|---|--|--|---|--|--|----|---|---|--|---|--|--|----|---|---|---|---|--|--|----|---|---|--|--|---|--|----|---|--|--|---|---|--|----|---|--|--|--|--|---|----|---|---|--|--|--|---|-----|---|--|---|--|--|---|-----|---|---|---|--|--|---|-----|---|--|--|---|--|---|-----------------------------------------|
| <p><b>On:</b></p> <p>Program selection with rack coding is activated. Imported programs can be replaced using buttons  to  .</p> <p><b>Off:</b></p> <p>Rack coding is inactive, programs can only be activated via the operating unit.</p> <p><b>Only:</b></p> <p>Program selection is possible only by means of rack coding.</p> <p>All sensors must close at least once when the rack is inserted, otherwise an error is displayed (see Chap. 10.1 "Procedure in the event of errors with process interruption").</p> <p>When the positioning sensor (Check T S105) is closed, the rack coding S101-S103, S106 and S107 is imported. Different programs can be activated, depending on the magnet combination. With button  , the machine starts with specified program.</p> <table><tr><th>Program No.</th><th>S105 (T)</th><th>S101 (A)</th><th>S102 (B)</th><th>S103 (C)</th><th>S106 (D)</th><th>S107 (E)</th></tr><tr><td>P1</td><td>T</td><td>A</td><td></td><td></td><td></td><td></td></tr><tr><td>P2</td><td>T</td><td>A</td><td>B</td><td></td><td></td><td></td></tr><tr><td>P3</td><td>T</td><td></td><td></td><td>C</td><td></td><td></td></tr><tr><td>P4</td><td>T</td><td>A</td><td></td><td>C</td><td></td><td></td></tr><tr><td>P5</td><td>T</td><td>A</td><td>B</td><td>C</td><td></td><td></td></tr><tr><td>P6</td><td>T</td><td>A</td><td></td><td></td><td>D</td><td></td></tr><tr><td>P7</td><td>T</td><td></td><td></td><td>C</td><td>D</td><td></td></tr><tr><td>P8</td><td>T</td><td></td><td></td><td></td><td></td><td>E</td></tr><tr><td>P9</td><td>T</td><td>A</td><td></td><td></td><td></td><td>E</td></tr><tr><td>P10</td><td>T</td><td></td><td>B</td><td></td><td></td><td>E</td></tr><tr><td>P11</td><td>T</td><td>A</td><td>B</td><td></td><td></td><td>E</td></tr><tr><td>P12</td><td>T</td><td></td><td></td><td>C</td><td></td><td>E</td></tr></table> <p style="text-align: right;">Fig 186</p> | Program No.     | S105 (T) | S101 (A) | S102 (B) | S103 (C) | S106 (D) | S107 (E) | P1 | T | A |  |  |  |  | P2 | T | A | B |  |  |  | P3 | T |  |  | C |  |  | P4 | T | A |  | C |  |  | P5 | T | A | B | C |  |  | P6 | T | A |  |  | D |  | P7 | T |  |  | C | D |  | P8 | T |  |  |  |  | E | P9 | T | A |  |  |  | E | P10 | T |  | B |  |  | E | P11 | T | A | B |  |  | E | P12 | T |  |  | C |  | E | <p>Basket Coding</p> <p>On/Off/Only</p> |
| Program No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | S105 (T)        | S101 (A) | S102 (B) | S103 (C) | S106 (D) | S107 (E) |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               | A        |          |          |          |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               | A        | B        |          |          |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               |          |          | C        |          |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               | A        |          | C        |          |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               | A        | B        | C        |          |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               | A        |          |          | D        |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               |          |          | C        | D        |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               |          |          |          |          | E        |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T               | A        |          |          |          | E        |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | T               |          | B        |          |          | E        |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | T               | A        | B        |          |          | E        |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| P12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | T               |          |          | C        |          | E        |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |
| <p><b>Arrangement of the sensors</b></p> <p>Clean side ← ————— → Unclean side</p> <div></div> <p style="text-align: right;">Fig. 371</p> <p><b>Standard rack coding</b></p> <p>Instrument rack 3-5 tiers / T+A+C / P4</p> <p>MIS instrument rack / T+A+E / P6</p> <p>Basic rack 1-tier / T+A+D / P6</p> <p>Basic rack 2-tier / T+A+D / P6</p> <p>Anaesthesia rack / T+A / P1</p> <p>Container rack / T+C+D / P7</p> <p>Baby bottle rack / T+B+E / P10</p> <p>(See Chap. 6.6.7 "Input switching statuses S101-S106"); (6.10.2 "Setting the self-disinfection timer"); (6.11.16 "Rack position in automatic loading and unloading station")</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |          |          |          |          |          |          |    |   |   |  |  |  |  |    |   |   |   |  |  |  |    |   |  |  |   |  |  |    |   |   |  |   |  |  |    |   |   |   |   |  |  |    |   |   |  |  |   |  |    |   |  |  |   |   |  |    |   |  |  |  |  |   |    |   |   |  |  |  |   |     |   |  |   |  |  |   |     |   |   |   |  |  |   |     |   |  |  |   |  |   |                                         |

### 6.10.17 Message text in case of error

| Function                                                                                                | Display message                           |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Technical support phone number (see Chap. 10 "Errors with program interruption and their elimination"). | Error Message<br>Tech. support Phone XXXX |

### 6.10.18 Printer drivers

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Display message  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>Panel:</b> Print-out from the panel printer (custom)<br><b>Panel Katakana:</b> Print-out from the panel printer (Katakana)<br><b>Desk (Star SP2000):</b> Print-out from the desktop printer Star SP2000<br><b>Desk (Star SP200):</b> Print-out from the desktop printer Star SP200<br><b>Panel Upside Down:</b> Print-out upside down (custom panel printer)<br>(See Chap. 7 "Batch print-out") and (8.4.3 "Overview of printer, bar-code reader and modem interfaces"). | Printer<br>Panel |

### 6.10.19 Door opening at end of program

| Function                                                                                                                                                                         | Display message                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| With full automation always "On"<br><i>On</i> = US door opens automatically at end of program.<br><i>Off</i> = Door remains closed at end of program.<br>Default setting = "Off" | Door open by Pro End<br>On/Off |

### 6.10.20 Door Interlock LS

| Function                                                                                                                                                                                                                                                                                                                                                                                                                    | Display message          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <i>"On"</i> = After pressing the button  , the LS door remains closed after program interruption by means of button  . "Door Interlock" appears on the display. The LS door can be opened after termination of the program.<br>Default setting = "On" | Door Interlock<br>On/Off |

### 6.10.21 User identification

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display message                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <p>The names or numbers are read into the system via the operating unit or via bar code reader for batch documentation.</p> <p>When user identification is active, a user query appears at the start of the program.</p> <p>Identification number must lie between 11-65 (barcode type EAN 13).</p> <p>Identification name 20 characters max. (barcode type 39).</p> <p>This is forwarded to the printer with Connector X31 (RS232) or to the interface with Screw Clamp X32 (RS485). The barcode scanner is also connected to Connector X31. A program can only be started once an entry has been made, otherwise the software remains on query.</p> <p>If "66" is entered, the text <i>"No Identification"</i> is forwarded.</p> <p>Default setting = "Off"</p> | <p>User Identification</p> <p>On/Off</p> |

### 6.10.22 Rack identification

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Display message                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <p>The rack numbers are read into the system via the operating unit or via bar code reader for batch documentation.</p> <p>When rack identification is active, a rack number query appears on the display after start of the program: <i>"Rack Name or No."</i>. After being entered, the number is forwarded to the printer and Batch Documentation System 8535 (see Chap. 8.4.1 "Batch Documentation System ICS 8535 / 8565").</p> <p>Identification number must lie between 11-65 (barcode type EAN 13).</p> <p>Identification name 20 characters max. (barcode type 39).</p> <p><b>Note:</b></p> <p><i>Only Digits 1-6 can be used for a number. (not possible: e.g. 17, 18, 19, 27, 28, 29...)</i></p> <p>This is forwarded to the printer with Connector X31 (RS232) or to the interface with Screw Clamp X32 (RS485). The barcode scanner is also connected to Connector X31. A program can only be started once an entry has been made, otherwise the software remains on query. If "66" is entered, the text <i>"No Identification"</i> is forwarded.</p> <p><i>On/Off:</i> Rack identification activated/deactivated</p> | <p>Rack Identification</p> <p>On/Off</p> |

### 6.10.23 Content On / Off

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Display message                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <p>When content identification is active, a content query (e.g. sieve tray number) appears on the display instead of "<i>Door is open</i>" when the door is open.</p> <p>The content is read (e.g. sieve trays)</p> <p>Identification number must lie between 11-65 or reads a text by means of a barcode scanner.</p> <p><b>Note:</b></p> <p><i>Only Digits 1-6 can be used for a number. (not possible: 17, 18, 19, 27, 28, 29...)</i></p> <p>This is forwarded to the printer with Connector X31 (RS232) or to the interface with Screw Clamp X32 (RS485). The barcode scanner is also connected to Connector X31. A program can only be started once an entry has been made, otherwise the software remains on query. If "66" is entered, the text "<i>No Identification</i>" is forwarded.</p> <p>Default setting = "<i>Off</i>"</p> | <p>Batch Content Ident</p> <p>On/Off</p> |

### 6.10.24 Step Repetition (Foam control)

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Display message                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <p>Function F1 (see Chap. 6.9.16 "Function F1 - Pre Rinsing").</p> <p><b>On</b></p> <p>If S109 opens during pre-rinsing (only in Function F1), the pre-rinsing step is repeated without error display. Two pre-rinse steps without comment appear in the batch documentation (see Chap. 7.1 "Program operation batch print-out (batch documentation)").</p> <p>If during repeat S109 opens again, an error signal is triggered, and pre-rinsing is discontinued with Error 113 (see Chap. 10.3 "Error display / error code table / cause and remedy").</p> <p><b>Off</b></p> <p>If S109 opens during pre-rinsing, Error 113 (see Chap. 10.3 "Error display / error code table / cause and remedy") is triggered and pre-rinsing is discontinued.</p> | <p>Step Repetition S109</p> <p>On/Off</p> |

## 6.11 Configuration Module 2

Configuration 2 of the Setup Settings.

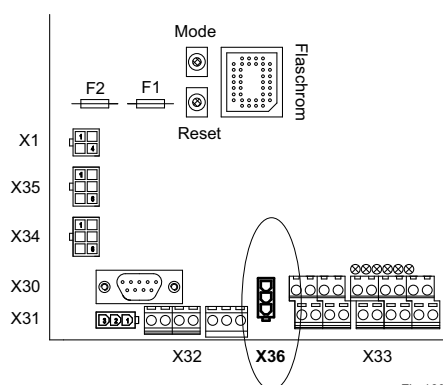


### Caution

All modifications of factory settings must be stored electronically or in paper form close to the device.

### 6.11.1 Service programs

Access to Configuration Module 2 is only possible with the Hardware Key Connector X36 (Fig. 183). This is only issued to Belimed-licensed service technicians after completing training for handling the controller.



### 6.11.2 Circulation pump operating level

| Function                                                                                                                                                                                                                      | Display message          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| The higher the operating level, the greater the water consumption.<br>Adjustment range 1.4-2.0V, default setting = 1.7V<br>(See Chap. 6.6.5 "Current values of level sensors") and (6.9.7 "Utility M1 Cold Water Step (CW)"). | Operating Level<br>1.7 V |

### 6.11.3 Entering the empty level

| Function                                                                                                                                    | Display message      |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Level sensor, default setting = 0.5 V<br>(See Chap. 6.6.5 "Current values of level sensors") and (6.9.7 "Utility M1 Cold Water Step (CW)"). | Empty Level<br>0.5 V |

### 6.11.4 Pumping-off time

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Display message                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <p>The holding time (t-drain) can be changed between program steps. It is measured only after the empty level (e.g. 0.5 V) has been reached. Depending on the drainage situation, the value must be readjusted and the time increased accordingly.</p> <p><b>Warning!</b></p> <p><i>Residual water can lead to transfer of suds between water steps.</i></p> <p>Range 0-99 s, default setting = 5 s</p> <p>Drainage pump opens for 20 s before every start of a program. (See also Chap.6.12 "Error threshold values (Limits Module)").</p> | <p>Drain Time</p> <p>30 sec</p> |

### 6.11.5 Drain

| Function                                                                                                                                                                                                                                    | Display message                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <p>Drainage pump configuration or drainage valve</p> <p>Default setting = drainage valve (pumping off is carried out in intervals when drainage pump is activated).</p> <p>(See Chap. 3.6.5 "Connection requirements for installation")</p> | <p>Drain</p> <p>Valve/Pump</p> |

### 6.11.6 Calibrating the temperature sensors

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Display message                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <p>Temperature and compensation factor for temperature sensors</p> <p>Range: +/- 5°C in steps of 0.1 °C</p> <p>When a temperature sensor deviates more than +/- 1 °C from the calibrated reference sensor, the temperature sensor must be corrected.</p> <p>NTC1 = Washing chamber sump control sensor (controls the process)</p> <p>NTC4 = DI water tank (not required)</p> <p>NTC5 = washing chamber sump monitoring sensor (display and printer)</p> <p>Further information (see Chap. 12.21 "Calibrating temperature sensors").</p> | <p>Calibrate Temp NTC1</p> <p>28.5°C+0.0°C=28.5°C</p> |

### 6.11.7 Temperature sensor allocation

| Function                                                                                                                                      | Display message                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| <p>The measurement type NTC or PT100 can be allocated to the temperature sensors.</p> <p>NTC = T1-6, PT100 = T7-10, default setting = NTC</p> | <p>Temperature Sensors</p> <p>NTC/PT100</p> |

### 6.11.8 LS door frame final position when doors are open

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Display message                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <p>Adjusting the potentiometer value R1 and positioning the linear drive.</p> <p>Open door using button  and save potentiometer value using button .</p> <p><b>Note:</b></p> <p><i>The potentiometer value should preferably be between 1-30, otherwise the position of the door frame must be adjusted using the threaded tree rods.</i></p> <p>The tolerance range until the error message "Door is open" appears is +/-30 units deviation from the stored value.</p> <p>Potentiometer value range:</p> <p>Linear motor extended = 0</p> <p>Linear motor retracted = 250</p>  <p>Fig 142</p> <p>Value saved for Open = 3 / value saved for Closed = 183</p> <p>Range defined as Open = 0-33 / range defined as Closed = 153-255</p> <p>Further information:</p> <p>(See Chap. 6.10.10 "Entering door contact pressure") and (6.8.3 "Direct activation Linear Drive (M41) LS").</p> <p>Example:</p> <p>The value saved when exerting contact pressure is 183. Closure is defined as the state where the potentiometer value after exerting contact pressure lies within <math>(183-30) = 153 - 250</math>. If the potentiometer value is 140 while pressing together, Error 100 "Door is open" is displayed (see Chap. 10.1 "Procedure in the event of errors with process interruption").</p> | <p>Final pos DS POT=215</p> <p>P1=open P2=Ok 033</p> |

### 6.11.9 LS door frame final position when doors are closed

| Function                                                                                                                                                                                                                                          | Display message                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <p>Adjustment and positioning of linear drive.</p> <p>225 = current potentiometer value, 193 = stored potentiometer value.</p> <p>(See Chap. 6.10.10 "Entering door contact pressure") and (6.8.3 "Direct activation Linear Drive (M41) LS").</p> | <p>Final Pos DS POT=225</p> <p>P1=close P2=Ok 193</p> |

### 6.11.10 US door frame final position when doors are open

| Function                                                                                                                                                         | Display message                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <p>Positioning-adjustment of linear drive</p> <p>(See Chap. 6.10.10 "Entering door contact pressure") and (6.8.4 "Direct activation Linear Drive (M42) US").</p> | <p>Final Pos US POT=005</p> <p>P1=open P2=Ok 035</p> |

### 6.11.11 US door frame final position when doors are closed

| Function                                                                                                                                             | Display message                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Positioning-adjustment of linear drive<br>(See Chap. 6.10.10 "Entering door contact pressure") and (6.8.4 "Direct activation Linear Drive (M42) US") | Final Pos CS POT=235<br>P1=close P2=Ok 205 |

### 6.11.12 Drying lag time

| Function                                                                                                                                                                                                | Display message              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| A fixed ventilator lag time is programmed in order to prevent damage to the electrical heating. The lag time is added to the programmed drying time.<br>Adjustment range 1-60 s; default setting = 30 s | Dryer Cooling Time<br>30 sec |

### 6.11.13 DI Boiler heater interlock with tank heater

| Function                                                                                                                                                                                                                                                                                  | Display message              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <i>On:</i> Tank heater (R16) is interlocked with DI Boiler heater (R26). The DI Boiler heater (R26) is interlocked with the dryer heater (R18).<br><i>Off:</i> Tank heater and DI Boiler heater are not interlocked.<br>(See Chap.3.6.8 "Electrical function diagram with steam drying"). | Lock Heater Boiler<br>On/Off |

### 6.11.14 Steam heated dryer

| Function                                                                                                                                                                                                                                                                                                                                                                             | Display message       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| For steam heated drying, both heaters are opened in parallel. Air and tank heaters are switched on when drying.<br><b>Caution!</b><br><i>Never set to "On" with electrical tank heater on! Default setting = "Off"</i><br>Further information:<br>(See Chap. 6.11.17 "Delay interval for washing-liquid heating") and (Chap. 3.6.8 "Electrical function diagram with steam drying"). | Dryer Steam<br>On/Off |

### 6.11.15 Potential-free output K28, K57 and K58

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <p>The signals can be allocated to Outputs (K28), (K57) and (K58). The relay (K28) is in the electro drawer. Default setting = end of program. Connection can be made potential-free or with voltage, depending on the type of connection.</p> <p><b>Signals:</b></p> <p><i>Error; program running (Run); end of program; open exhaust flap (drying); pre shut-off valves; chamber lighting</i></p> <p><b>Error</b></p> <p>An error causes the current program to be interrupted and closes (K28), (K57) and (K58). Information for the house control system.</p> <p><b>Exhaust flap function (drying)</b></p> <p>When the drying or condensing step M5, M6 starts, (K28), (K57) and (K58) close. (K28) closes before the relay (K17) is activated. In automatically propelled exhaust flaps, the flap can be opened before the drying ventilator is activated.</p> <p><b>Pre shut-off valve function</b></p> <p>(K28), (K57) or (K58) are closed when a program is running or the valve (Y27) for DI water pre-heating is activated.</p> <p><b>Chamber lighting function</b></p> <p>(K28), (K57) and (K58) are closed when a program is running, the doors are open or a program has been finished in which the door has not yet been opened.</p> <p><b>Note:</b></p> <p><i>(K57) and (K58) are optional and only possible with additional PCB!</i></p> <p>(See Chap. 6.10.8 "Signal K28") and (Chap. 5.3 "Electro drawer with PCBs")</p> | <p>Output K28</p> <p>Program finished</p><br><p>Output K57</p> <p>Program run</p><br><p>Output K58</p> <p>Exhaust Flap</p> |

### 6.11.16 Rack position in automatic loading and unloading station

| Function                                                                                                                                                                                                                                                                                                                                                                        | Display message                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <p>After Switch (S105) has been read in, the automatic loading and unloading motor (M33) continues running for the selected delay interval. Delay interval is shown in milliseconds.</p> <p><b>Note:</b></p> <p><i>Rack must be positioned correctly.</i></p> <p>(See Chap. 6.10.16 "Automatic rack recognition") and (12.22 "Automatic loading and unloading (optional)").</p> | <p>Delay Rack Position</p> <p>200 ms</p> |

### 6.11.17 Delay interval for washing-liquid heating

| Function                                                                                                                                                                                                                                                                                                                                                                            | Display message                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <p>When the washing-liquid temperature falls below the target, the heater is switched on or off with delay.</p> <p><b>Note:</b></p> <p><i>The delay interval for electrical heaters must not be too short (preferably 10 s), as Relay K16 is otherwise overloaded.</i></p> <p>Reduce the delay interval to approx. 2 s for steam-heated water heating with high steam pressure.</p> | <p>Interval Water Heat</p> <p>10 sec</p> |

### 6.11.18 Waste water cooling

| Function                                                                                                                                                                                                   | Display message                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <p>If the temperature of the water in the tub exceeds 60°C, the CW valve Y25 is activated. The CW is fed into the drain before the T-piece of the condensed-water drain.</p> <p>Default setting = "On"</p> | <p>Cool down Y25</p> <p>On/Off</p> |

### 6.11.19 Allocation of address for the ICS 85X5 archiving system

| Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display message                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <p>Address for RS485 interfaces (see Chap. 8.4 "Interfaces"). Allocate Device Numbers 4-9. Addresses 1-3 are reserved for sterilisers.</p> <p>0 = interface inactive.</p> <p>Device Number 1: Address 4</p> <p>Device Number 2: Address 5</p> <p>Device Number 3: Address 6</p> <p>Device Number 4: Address 7</p> <p>When Address RS485 is not 0, the RS485 interface is queried for communication during stand-by mode. If communication fails for 10 s, Error 188 appears on the display instead of "Program ready" (see Chap. 10.3 "Error display / error code table / cause and remedy").</p> | <p>Interface</p> <p>Address RS 485      0</p> |

### 6.11.20 Activating Error 188

| Function                                                                                                                                                                                                                                                                                         | Display message                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <p>Message to the software via an additional PCB.</p> <p>Activate Error 188 with "On". Default setting = "Off"</p> <p>Further information:</p> <p>(See Chap. 10.3 "Error display / error code table / cause and remedy") and (Chap. 3.3.6 "Independent content documentation system (IPD)").</p> | <p>Digital Interface 1</p> <p>On/Off</p> |

### 6.11.21 Display activation

| Function                                                                                                                                | Display message |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Europe / English:<br>Selection of European display <i>AJ</i><br>Japan /English<br>Selection of Japanese and Norwegian display <i>AA</i> | Display type    |

### 6.11.22 Password for detergent manufacturers

| Function                                                                                    | Display message       |
|---------------------------------------------------------------------------------------------|-----------------------|
| Range: 1-6 per digit (3 digits)<br>Default setting = 321<br>(See Chap. 6.1 "Access rights") | Password Doser<br>XXX |

### 6.11.23 Password for clinical technicians

| Function                                                                                    | Display message          |
|---------------------------------------------------------------------------------------------|--------------------------|
| Range: 1-6 per digit (3 digits)<br>Default setting = 261<br>(See Chap. 6.1 "Access rights") | Password Customer<br>XXX |

### 6.11.24 Entering the machine number

| Function                            | Display message                   |
|-------------------------------------|-----------------------------------|
| Default setting = (000000_0000_000) | Machine Number<br>000000 0000 000 |

### 6.11.25 Entering the manufacturing date

| Function                                    | Display message                  |
|---------------------------------------------|----------------------------------|
| Default setting = 00.00.0000 Day.Month.Year | Manufacturing Date<br>--.--.---- |

### 6.11.26 PCB replacement

| Function                                                                      | Display message                |
|-------------------------------------------------------------------------------|--------------------------------|
| Date following PCB replacement<br>Default setting = 00.00.0000 Day.Month.Year | PCB Changed Date<br>--.--.---- |

### 6.11.27 Batch counter adjustment

| Function                                                                                                                                                                                                                             | Display message                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <p>The batch number is lost when the software is loaded. The batch number must always be recorded beforehand and re-entered subsequently.</p> <p>Default setting = 000000</p> <p>(See Chap. 6.10.3 "Maintenance (batch number)")</p> | <p>Batch Counter Start</p> <p>0</p> |

### 6.11.28 Modem connection (optional)

| Function                                                                                                                                                                                                                                                                  | Display message                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <p>Phone number for external modem connection</p> <p>, = pause</p> <p>0 = external</p> <p>W = waiting for second dial tone</p> <p>+4141... = phone number of modem service centre</p> <p>(See Chap.8.4.3 "Overview of printer, barcode reader and modem interfaces").</p> | <p>Support Phone No.</p> <p>,0W +4141 935 55 55</p> |

## 6.12 Error threshold values (Limits Module)

In this mode, threshold values for error messages are adjusted. Every modification must be documented precisely.



#### Caution

Increasing the threshold values entails higher risk!

The Belimed service technician is personally responsible for the modifications he has implemented. **The manufacturer accepts no responsibility for damages caused by operating errors or by not observing the instructions in the manual.**

| Function                                                                                                                                                                                                                                        | Display message                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <p><b>Error threshold values</b></p> <p>LED Program Button  lit.</p> <p>Last modification in the threshold value module.</p>                                 | <p>Limits</p> <p>Last mod. 00.00.00</p> |
| <p><b>Error Code 140</b></p> <p>Threshold value modification for Input S, SD during the filling process (see Chap. 8.2.4 "SD DI boiler float switch").</p> <p>Adjustment range: 10-45 minutes, default setting = 15 minutes</p>                 | <p>DI boiler SD</p> <p>15 min</p>       |
| <p><b>Error Code 141</b></p> <p>Threshold value modification for cold water supply "tkw" during the filling process (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").</p> <p>Adjustment range: 1-15 minutes, default setting = 5 minutes</p> | <p>CW Water P1</p> <p>5 min</p>         |

| Function                                                                                                                                                                                                                                    | Display message           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Error Code 142</b><br>Threshold value modification for warm water supply during the filling process (see Chap. 6.9.8 "Utility M2 Warm Water Step (WW)").<br>Adjustment range: 1-15 minutes, default setting = 5 minutes                  | WW Water P<br>5 min       |
| <b>Error Code 143</b><br>Threshold value modification for DI water supply during the filling procedure (see Chap. 6.9.10 "Utility M4 DI Water Step").<br>Adjustment range: 1-20 minutes, default setting = 7 minutes                        | DI Water P1<br>7 min      |
| <b>Error Code 146</b><br>Threshold value modification for pre-heated DI water supply during the filling procedure (see Chap. 6.9.13 "Pre-heated DI water M9 (Final Rinse)").<br>Adjustment range: 3-15 minutes, default setting = 3 minutes | DI Water Boiler<br>3 min  |
| <b>Error Code 148</b><br>Threshold value modification for drainage (see Chap. 6.11.4 "Pumping-off time").<br>Adjustment range: 3-15 minutes, default setting = 3 minutes                                                                    | Drain P1<br>3 min         |
| <b>Error Code 161</b><br>Threshold value modification for minimal water heating in the tub (see Chap. 6.6.3 "Current values of temperature sensors 1-4").<br>Adjustment range: 1-6 minutes, default setting = 3 minutes                     | Delta Temp NTC 1<br>3 min |
| <b>Error Code 162</b><br>Threshold value modification for minimal water heating in the DI boiler (see Chap. 6.6.3 "Current values of temperature sensors 1-4").<br>Adjustment range: 1-6 minutes, default setting = 3 minutes               | Delta Temp NTC 4<br>3 min |

## 7 Batch print-out

### 7.1 Program operation batch print-out (batch documentation)

► Activate printer in stand-by mode using button 

**Sample batch print-out:**

| Deutsch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Français                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Substeri West 1</b><br>Belimed WD 290<br>Maschinennummer 99814.0161.113<br>23.10.2007 Batch No. 15<br>Programm P1<br>Wagen Name / Nr. 5<br>Benutzername / Nr.: 2<br><b>Instrumente Normal</b><br>Schritt Eins. WD IPD<br>-----<br>Vorspülen 14:25<br>S1.1 T1 22°C 36°C 1Min<br>P1 144mBar<br>Reinigen 14:28<br>S2.1 T1 30°C 34°C 0Min<br>D1 1.0mL/L 32mL 33mL<br>P1 158mBar<br>S2.2 T1 34°C 36°C 3Min<br>P1 149mBar<br>Reinigen 14:34<br>S3.1 T1 45°C 48°C 5Min<br>D1 6.0mL/L 193mL 193mL<br>P1 305mBar<br>S3.2 T1 85°C 86°C 5Min<br>P1 179mBar<br>Spülen 14:57<br>S4.1 T1 65°C 67°C 1Min<br>P1 238mBar<br>Reinspülen 15:00<br>S5.1 T1 31°C 35°C 1Min<br>P1 331mBar<br>Desinf.Ao 3000 15:03<br>S6.1 T1 93°C 93°C 1Min<br>P1 292mBar<br>C0 28u5/cm<br>S6.2 T1 93°C 93°C 1Min<br>P1 295mBar<br>C0 29u5/cm<br>Trocknen 15:22<br>S7.1 T2 122°C 35°C 4Min<br>-----<br>Programm P1 korrekt beendet<br>Total Programmzeit 68Min 15:33<br>Ao=4417, Desinfektion i.O.<br>Verifikation IPD ok<br>Freigabe: Ja/Nein<br>----- | <b>Substeri West 1</b><br>Belimed WD 290<br>Machine Number 99814.0161.113<br>23.10.2007 Batch No. 15<br>Program P1<br>Rack Name / No. 5<br>User Name / No. 2<br><b>Instruments Normal</b><br>Step Setup WD IPD<br>-----<br>PRE WASH 14:25<br>S1.1 T1 22°C 36°C 1Min<br>P1 144mBar<br>WASH 14:28<br>S2.1 T1 30°C 34°C 0Min<br>D1 1.0mL/L 32mL 33mL<br>P1 158mBar<br>S2.2 T1 34°C 36°C 3Min<br>P1 149mBar<br>WASH 14:34<br>S3.1 T1 45°C 48°C 5Min<br>D1 6.0mL/L 193mL 193mL<br>P1 305mBar<br>S3.2 T1 85°C 86°C 5Min<br>P1 179mBar<br>RINSE 14:57<br>S4.1 T1 65°C 67°C 1Min<br>P1 238mBar<br>CLEAN RINSING 15:00<br>S5.1 T1 31°C 35°C 1Min<br>P1 331mBar<br>DISINF.Ao 3000 15:03<br>S6.1 T1 93°C 93°C 1Min<br>P1 292mBar<br>C0 28u5/cm<br>S6.2 T1 93°C 93°C 1Min<br>P1 295mBar<br>C0 29u5/cm<br>DRY 15:22<br>S7.1 T2 122°C 35°C 4Min<br>-----<br>Program P1 correctly finished<br>Total Program time 68Min 15:33<br>Ao=4417, Disinfection i.O.<br>Verification IPD ok<br>Release: yes/no<br>----- | <b>Substeri West 1</b><br>Belimed WD 290<br>Numéro de Machines 99814.0161.113<br>23.10.2007 Batch No. 15<br>Programme P1<br>Chariot / No. 5<br>Utilisateur / No. 2<br><b>Instruments normal</b><br>Par etape Reglage WD IPD<br>-----<br>Rincage Prelim. 14:25<br>S1.1 T1 22°C 36°C 1Min<br>P1 144mBar<br>Nettoyage 14:28<br>S2.1 T1 30°C 34°C 0Min<br>D1 1.0mL/L 32mL 33mL<br>P1 158mBar<br>S2.2 T1 34°C 36°C 3Min<br>P1 149mBar<br>Nettoyage 14:34<br>S3.1 T1 45°C 48°C 5Min<br>D1 6.0mL/L 193mL 193mL<br>P1 305mBar<br>S3.2 T1 85°C 86°C 5Min<br>P1 179mBar<br>Rincer 14:57<br>S4.1 T1 65°C 67°C 1Min<br>P1 238mBar<br>Rincage Final 15:00<br>S5.1 T1 31°C 35°C 1Min<br>P1 331mBar<br>Desinf.Ao 3000 15:03<br>S6.1 T1 93°C 93°C 1Min<br>P1 292mBar<br>C0 28u5/cm<br>S6.2 T1 93°C 93°C 1Min<br>P1 295mBar<br>C0 29u5/cm<br>Sechage 15:22<br>S7.1 T2 122°C 35°C 4Min<br>-----<br>Programme P1 correctement terminé<br>Duree du Programme 68Min 15:33<br>Ao=4417, desinfection i.O.<br>Vérification IPD ok<br>Approuve: Oui/Non<br>----- |

Fig 184

## 7.2 Batch print-out in the event of error or program interruption

When the printer is activated in stand-by mode using button , all inputs, outputs, sensor values and the error code for program interruption are recorded.

## 7.3 Printing the setup settings and program recipe



### Note

All parameters and configurations are lost when the Processor PCB is replaced (see Chap. 9 "Downloading the control software").

Keep a print-out of the data with the device after taking the device into operation.

- ▶ Press button 
- ▶ "*Print operating*" appears on the display.
- ▶ Activate printer using button 
- ▶ Press button 
- ▶ "*Print operating data*" appears on the display.
- ▶ During this display message, press button . Printing process starts

Further information:

(See Chap.6.9.6 "Parameter entry overview") and (Chap. 6.10.18 "Printer drivers")

## 8 Configuration of connections

### 8.1 Inputs / outputs

| Label            | Inputs                                         | Label              | Outputs                                                  |
|------------------|------------------------------------------------|--------------------|----------------------------------------------------------|
| <b>Inputs X2</b> |                                                | <b>Outputs X17</b> |                                                          |
| S101             | <b>A</b> Automatic program recognition         | Y11                | CW valve                                                 |
| S102             | <b>B</b> Automatic program recognition         | Y12                | WW valve                                                 |
| S103             | <b>C</b> Automatic program recognition         | Y13                | DI valve                                                 |
| S104             | External reset / close US door                 | K14                | DI tank drainage (optional)                              |
| S105             | <b>T</b> Rack positioning / test               | K15                | Circulation pump                                         |
| S106             | <b>D</b> Automatic program recognition         | K16                | Tank heating                                             |
| S107             | <b>E</b> Automatic program recognition         | K17                | Dryer fan                                                |
| S108             | <b>F</b> Automatic program recognition         | K18                | Dryer heating                                            |
| S109             | Pressure switch for clogged screen (opener)    | <b>Outputs X18</b> |                                                          |
| S110             | LS door auxiliary relay closed                 | M21                | Dosing pump 1                                            |
| S111             | US door auxiliary relay closed                 | M22                | Dosing pump 2                                            |
| S112             | LS Door switch open                            | M23                | Dosing pump 3                                            |
| S113             | US Door switch open                            | M24                | Dosing pump 4                                            |
| <b>Inputs X3</b> |                                                | Y25                | CW Valve drain cooling 60 °C                             |
| S201             | Empty level indicator 1                        | K26                | DI Tank boiler heater                                    |
| S202             | Empty level indicator 2                        | Y27                | CW Valve (DI) condenser                                  |
| S203             | Empty level indicator 3                        | K28                | Signal End, Run, Error, Exhaust Valve                    |
| S204             | Empty level indicator 4                        |                    |                                                          |
| S205             | Empty level indicator 5                        | Y/M31              | Drainage valve / drainage pump ( <b>Connection X19</b> ) |
| S206             | Autom. loading and unloading station           | K32                | Dosing pump 5 ( <b>Connection X20</b> )                  |
| S207             | Automated system - manually                    | K33                | Rack drive in the device ( <b>Connection X21</b> )       |
| S208             | Automated system - automatically               | M34                | ( <b>Connection X22</b> )                                |
| S209             | Safety switch actuator LS                      | K35                | Open LS hoist motor ( <b>Connection X23</b> )            |
| S210             | Safety switch actuator US                      | K36                | Close LS hoist motor ( <b>Connection X24</b> )           |
| S211             | Pressure switch 50 mbar                        | K37                | Open US hoist motor ( <b>Connection X25</b> )            |
| S212             | Filter differential pressure switch (optional) | K38                | Close US hoist motor ( <b>Connection X26</b> )           |
| S213             | Exhaust system error (external)                | M41                | LS linear motor ( <b>Connection X53</b> )                |
| <b>Inputs X4</b> |                                                | M42                | US linear motor ( <b>Connection X54</b> )                |
| SA               | Load shut-off                                  |                    |                                                          |
| SB               | Floor pan leakage                              |                    | Additional PCB( <b>Connections X63</b> )                 |
| SC               | DI Boiler code                                 | K57                | Signal End, Run, Error, Exhaust Valve                    |
| SD               | DI Boiler float switch                         | K58                | Signal End, Run, Error, Exhaust Valve                    |
| SE               | Open LS door                                   |                    |                                                          |
| SF               | Close US door                                  |                    |                                                          |

## 8.2 Inputs X4

### 8.2.1 SA Peak load block (building)

If Input SA is closed, the program in operation is not interrupted. A new program cannot be activated. "Program ready" appears on the display instead of *"Peak Load Block"*.

### 8.2.2 SB Floor pan leakage

If Input SB is closed, the program in operation is interrupted. *"Leakage Pan"* appears on the display, Error Code 112 (see Chap. 10 "Errors with program interruption and their elimination")

### 8.2.3 SC DI boiler code

If Input SC is closed, a DI boiler is connected. Temperature Sensor NTC4 is monitored. Functions for boiler operation (float switch SD, K26, NTC4, K34) are activated (see Chap. 6.9.13 "Pre-heated DI water M9 (Final Rinse)").

### 8.2.4 SD DI boiler float switch

Float switch for DI boiler is active only if SC is closed.

### 8.2.5 SE Open LS door

If Input SE is closed, the LS door is opened (automatic loading) (see Chap. 12.22 "Automatic loading and unloading (optional)").

### 8.2.6 SF Close door

If Input SF is closed, the US door is closed (automatic loading) (see Chap. 12.22 "Automatic loading and unloading (optional)").

Further information:

(See Chap. 6.6.16 "Input switching statuses SA to SF")

## 8.3 Temperature sensors

**NTC1** = Tank temperature sensor (K16) for process control

**NTC2** = Temperature sensor for dryer (K18)

**NTC3** = Empty

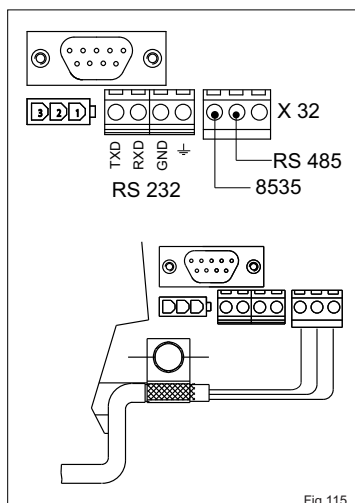
**NTC4** = Temperature sensor for DI boiler (K26)

**NTC5** = Tank temperature sensor during Steps (M1-M4), (M9) and batch documentation/printer and documentation 85X5

**NTC6** = Empty

## 8.4 Interfaces

### 8.4.1 Batch Documentation System ICS 8535 / 8565



#### Interface RS 485

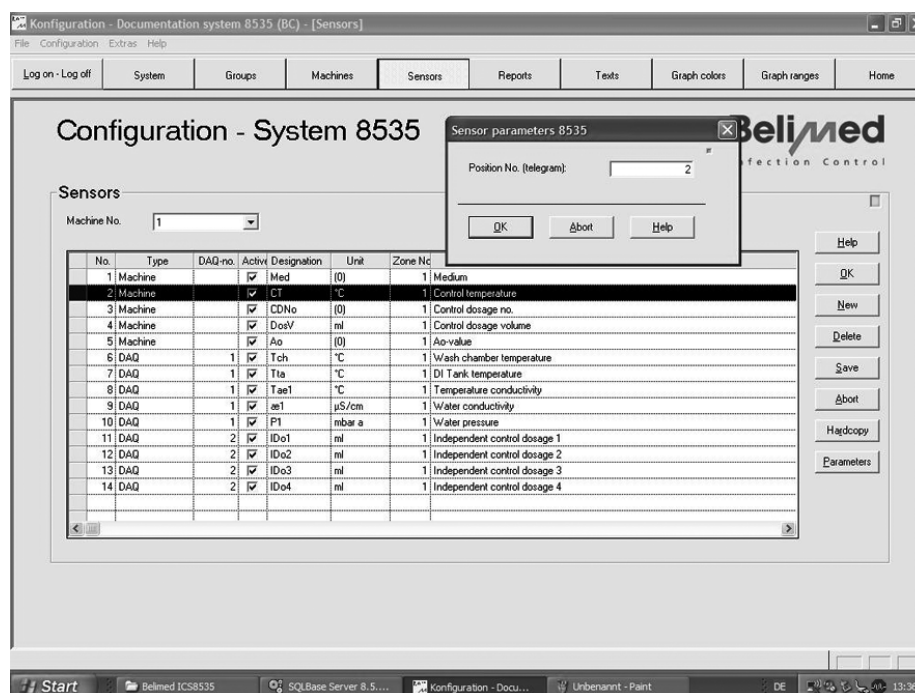
Connections for Batch Documentation System ICS 8535 (Fig. 115).

#### Address allocation

(See Chap. 6.11.19 "Allocation of address for the ICS 85X5 archiving system")

(See also Chap. 6.10.22 "Rack identification")

### 8.4.2 Telegram allocation for batch documentation system



**Telegram allocation for position number activation (ECU 2000)**

| No. | Type    | Abbreviation   | Description                    | Pos. No. |
|-----|---------|----------------|--------------------------------|----------|
| 1   | Machine | Med            | Medium                         | 1        |
| 2   | Machine | CT             | Temperature Sensor NTC5 / NTC2 | 2        |
| 3   | Machine | CDNo           | Doser Number                   | 4        |
| 4   | Machine | DosV           | Dosing volume                  | 8        |
| 5   | Machine | A <sub>0</sub> | A <sub>0</sub> -Value          | 7        |
| 14  | Machine | t              | Remaining Run Time             | 9        |

**Telegram allocation for independent recording with DAQ channel allocation (optional)**

| No. | Type | Abbreviation | Description              | Pos. No. |
|-----|------|--------------|--------------------------|----------|
| 6   | DAQ  | T1           | Air Temperature PT 100   | 0        |
| 7   | DAQ  | T2           | Water Temperature PT 100 | 0        |
| 8   | DAQ  | ae1          | Conductivity             | 0        |
| 9   | DAQ  | P1           | Analogue Water Pressure  | 0        |
| 10  | DAQ  | IDo1         | Independent Flow 1       | 1        |
| 11  | DAQ  | IDo2         | Independent Flow 2       | 1        |
| 12  | DAQ  | IDo3         | Independent Flow 3       | 2        |
| 13  | DAQ  | IDo4         | Independent Flow 4       | 2        |


**Caution**

If software not tested and approved by Belimed is used, Belimed accepts no responsibility, and no warranty claims of any kind will be accepted. This applies to operational software of the device, and also with regard to data-backup purposes.

### 8.4.3 Overview of printer, barcode reader and modem interfaces

RS232/485 (2x) are separated with regard to voltage.

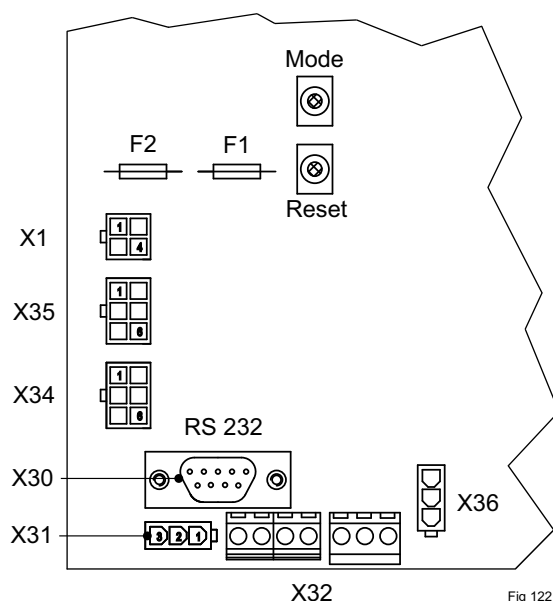


Fig 122

| No. | Connector                       | Function / interface                                                                                                                                                     |
|-----|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| X1  | Printed circuit board connector | 24V supply AC                                                                                                                                                            |
| X30 | Serial interface                | CADI-PC or modem interface RS 232                                                                                                                                        |
| X31 | Printed circuit board connector | Printer, scanner, Interface RS 232                                                                                                                                       |
| X32 | Screw clamp                     | Interface RS 232 (inactive)<br>Interface RS 485 for Batch Documentation ICS 8535<br>1. Clamp from left (Data-)<br>2. Clamp from left (Data+)<br>3. Clamp from left (GND) |
| X34 | Printed circuit board connector | Data connection to controllers                                                                                                                                           |
| X35 | Printed circuit board connector | Data connection to controllers                                                                                                                                           |
| X36 | Printed circuit board connector | Hardware key (see Chap. 6.1 "Access rights")                                                                                                                             |
| S1  | Reset Button red                | Reset Button                                                                                                                                                             |
| S2  | Mode Button                     | Boot Mode                                                                                                                                                                |

When multiple machines are set up, an additional 150 Ohm resistor must be inserted at the connection (X32) for the ICS 8535 of the last machine.

Adjusting and operating the:

**Printer** (see Chap. 7 "Batch print-out").

**Barcode reader** (see Chap. 6.10.22 "Rack identification") and (6.10.23 "Content On / Off").

**Modem** (see Chap. 6.11.28 "Modem connection (optional)").

## 9 Downloading the control software

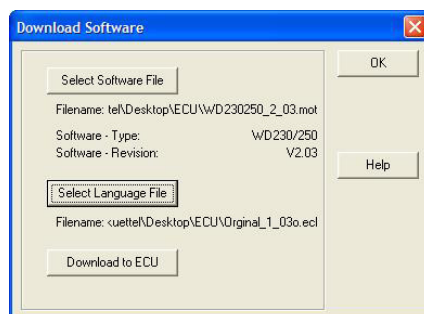
### 9.1 Software selection and download



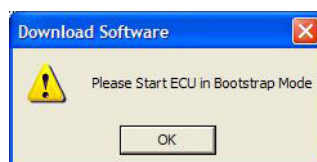
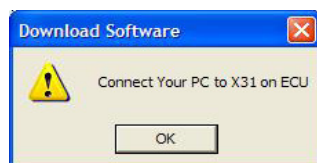
#### Note

The setup data must be always saved using the "save setup" button before loading any new system software (Firmware); otherwise all system stored data will be lost. After loading the new software, load the saved set up data to restore information such as machine serial number, manufacturing date, date of the last board change and batch count (see Chap. 7.3 "Printing the setup settings and program recipe").

- Locating the software / software download



- Confirm path (.mot) with "Download to ECU"
- Connect with controller using data communication cable



- Press black Mod-button and at the same time briefly press red Reset button
- Release Mod-button and confirm with "OK"

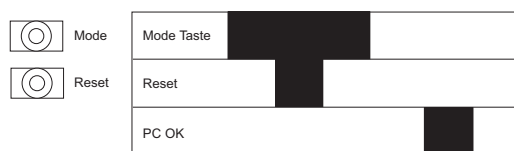


Fig 191

- Restart controller using Reset button. Software will be loaded



## 10 Errors with program interruption and their elimination

### 10.1 Procedure in the event of errors with process interruption



#### **Danger**

Errors with process interruption must be rectified exclusively by the technical support service!

Turn off the main switch before carrying out any intervention on the device.

Error causes can be systematically tracked with the analysis software (see Chap. 6.6.18 "Last ten errors") and recorded with the data logger.

For errors which occur irregularly, the status of in- and outputs at the time the error occurred must be recorded via print-out (see Chap. 7.2 "Batch print-out in the event of error or program interruption"). Poorly crimped or lacking connector contacts may be the cause.



#### **Note**

Do not replace any components if the cause of the error has not been definitely clarified. Replaced parts may still be functioning.

### 10.2 Low voltage colour code

Low voltage cables (secondary voltage after 24V AC transformation) have a colour code.

Label syntax e.g. X2 (connector) / 5 (Pin 5)

| Description                                     | Voltage       | Colour |
|-------------------------------------------------|---------------|--------|
| <b>Valves / AC loads</b>                        |               |        |
| Secondary voltage 24 V                          | 24 Volts AC   | Purple |
| Secondary voltage COM (shared)                  | 24 Volts AC   | Green  |
| <b>Switch</b>                                   |               |        |
| Switching signals S101...                       | 24 Volt DC    | Orange |
| Switching signals GND                           | 0 Volt DC     | Grey   |
| <b>Temperature sensors</b>                      |               |        |
| Signal leads for NTC sensors                    | +5 Volt DC    | Yellow |
| <b>Level and pressure sensors</b>               |               |        |
| Signal leads for level and pressure sensors     | 24 Volt DC    | Orange |
| Signal leads for level and pressure sensors GND | 0 Volt DC     | Grey   |
| Signal leads for level and pressure sensors     | 0.5-4.5 Volts | Pink   |

### 10.3 Error display / error code table / cause and remedy

| 100                                              | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display message |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|----------------------------|-----------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------|-------------------------------------------|----------------------|------------------------------|--------------------------------------------------|----------------------|---------------------------------------------------------------------------------|--------------------------------------------------|-----------------------|-------------------|-------------------------|-----------------------------------|-----------------------|-------------------------------------------------|
|                                                  | <p>LS switch (S1), relay (K1) or potentiometer value (R1) is not within range or has gone out of range while program was running (see Chap. 6.11.8 "LS door frame final position when doors are open") and (6.11.10 "US door frame final position when doors are open").</p> <p><b>Input</b> (S110), (R1) and (R2) is monitored only while program is running</p> <table><tr><td><b>Cause:</b></td><td><b>Remedy:</b></td></tr><tr><td>Switch (S1) remains open</td><td>Readjust or replace switch</td></tr><tr><td>Switch (S1) closed or defective</td><td>Cable interrupted, readjust or replace switch</td></tr><tr><td>Signal cable for linear drive interrupted</td><td>Repair interruption</td></tr><tr><td>Linear drive defective</td><td>Replace</td></tr><tr><td>Relay (K1) defective</td><td>Replace</td></tr><tr><td>Potentiometer values are not within target range</td><td>Recalibrate doors</td></tr><tr><td>Mechanical defect</td><td>Repair or replace parts</td></tr><tr><td>Connectors loose</td><td>Check all connections</td></tr></table> | <b>Cause:</b>   | <b>Remedy:</b> | Switch (S1) remains open   | Readjust or replace switch                                                              | Switch (S1) closed or defective | Cable interrupted, readjust or replace switch | Signal cable for linear drive interrupted | Repair interruption  | Linear drive defective       | Replace                                          | Relay (K1) defective | Replace                                                                         | Potentiometer values are not within target range | Recalibrate doors     | Mechanical defect | Repair or replace parts | Connectors loose                  | Check all connections | <p>Door is open</p> <p>Error Code 100</p>       |
| <b>Cause:</b>                                    | <b>Remedy:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Switch (S1) remains open                         | Readjust or replace switch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Switch (S1) closed or defective                  | Cable interrupted, readjust or replace switch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Signal cable for linear drive interrupted        | Repair interruption                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Linear drive defective                           | Replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Relay (K1) defective                             | Replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Potentiometer values are not within target range | Recalibrate doors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Mechanical defect                                | Repair or replace parts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Connectors loose                                 | Check all connections                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| 101                                              | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display message |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
|                                                  | <p>If the opening process with Motor (M35) LS takes longer than 16 s until the switch (S112) opens, or if the potentiometer value (R1) LS is closed, the controller terminates the process with error display.</p> <p><b>Input</b> (S112), (R1) is monitored during the opening process.</p> <table><tr><td><b>Cause:</b></td><td><b>Remedy:</b></td></tr><tr><td>Linear motor does not open</td><td>Test linear motor manually on Door Panel PCB (see Chap. 5.3 "Electro drawer with PCBs")</td></tr><tr><td></td><td>Recalibrate door</td></tr><tr><td></td><td>Replace linear motor</td></tr><tr><td>Motor (M35) does not respond</td><td>Activate motor (M35) by means of contactor (K35)</td></tr><tr><td></td><td>Replace door motor or capacitor (6.8.2 "Direct selection of Actuators K11-K16")</td></tr><tr><td>Switch (S112) does not open</td><td>Replace switch (S112)</td></tr><tr><td>Mechanical defect</td><td>Repair or replace parts</td></tr><tr><td>Plug-in connections (S112) to PCB</td><td>Re-crimp</td></tr></table>                     | <b>Cause:</b>   | <b>Remedy:</b> | Linear motor does not open | Test linear motor manually on Door Panel PCB (see Chap. 5.3 "Electro drawer with PCBs") |                                 | Recalibrate door                              |                                           | Replace linear motor | Motor (M35) does not respond | Activate motor (M35) by means of contactor (K35) |                      | Replace door motor or capacitor (6.8.2 "Direct selection of Actuators K11-K16") | Switch (S112) does not open                      | Replace switch (S112) | Mechanical defect | Repair or replace parts | Plug-in connections (S112) to PCB | Re-crimp              | <p>Door does not open</p> <p>Error Code 101</p> |
| <b>Cause:</b>                                    | <b>Remedy:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Linear motor does not open                       | Test linear motor manually on Door Panel PCB (see Chap. 5.3 "Electro drawer with PCBs")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
|                                                  | Recalibrate door                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
|                                                  | Replace linear motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Motor (M35) does not respond                     | Activate motor (M35) by means of contactor (K35)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
|                                                  | Replace door motor or capacitor (6.8.2 "Direct selection of Actuators K11-K16")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Switch (S112) does not open                      | Replace switch (S112)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Mechanical defect                                | Repair or replace parts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |
| Plug-in connections (S112) to PCB                | Re-crimp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |                |                            |                                                                                         |                                 |                                               |                                           |                      |                              |                                                  |                      |                                                                                 |                                                  |                       |                   |                         |                                   |                       |                                                 |

| 102                                       | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------|---------------------------------|--------------------|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------|---------------------------------------------|
|                                           | <p>If the closure process with Motor LS (M35) takes longer than 16 s until the upper switch (S1/K1) closes or the potentiometer value (R1) is closed, the controller terminates the process with error display.</p> <p><b>Input</b> (S110), (R1) is monitored during the closure process.</p> <p><i>Cause and remedy (see Error 101)</i></p> <table><tr><td><b>Cause:</b></td><td><b>Remedy:</b></td></tr><tr><td>Relay ESR 1 LED green</td><td>No action required</td></tr><tr><td>LED yellow = resistance</td><td>Replace safety switch actuator (12.18 "Dismantling the door system (loading side)")</td></tr><tr><td>LED red = cable interrupted/short circuit</td><td>Replace safety switch actuator, repair cable interruption</td></tr></table>                   | <b>Cause:</b>                                    | <b>Remedy:</b> | Relay ESR 1 LED green           | No action required | LED yellow = resistance | Replace safety switch actuator (12.18 "Dismantling the door system (loading side)") | LED red = cable interrupted/short circuit | Replace safety switch actuator, repair cable interruption                           | <p>Door does not close</p> <p>Error Code 102</p> |                                                           |                                             |
| <b>Cause:</b>                             | <b>Remedy:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| Relay ESR 1 LED green                     | No action required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| LED yellow = resistance                   | Replace safety switch actuator (12.18 "Dismantling the door system (loading side)")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| LED red = cable interrupted/short circuit | Replace safety switch actuator, repair cable interruption                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| 103                                       | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
|                                           | <p>LS safety switch actuator (S209) has been triggered. If during the closure process the safety switch actuator opens Relay ESR1, the controller terminates the closure process with error display and reopens the door (M35).</p> <p><b>Input</b> (S209) is monitored during the closure process.</p> <table><tr><td><b>Cause:</b></td><td><b>Remedy:</b></td></tr><tr><td>Safety relay ESR 1 is defective</td><td>Replace ESR</td></tr><tr><td>Relay ESR 1 LED green</td><td>No action required</td></tr><tr><td>LED yellow = resistance</td><td>Replace safety switch actuator (12.18 "Dismantling the door system (loading side)")</td></tr><tr><td>LED red = cable interrupted</td><td>Replace safety switch actuator, repair cable interruption</td></tr></table> | <b>Cause:</b>                                    | <b>Remedy:</b> | Safety relay ESR 1 is defective | Replace ESR        | Relay ESR 1 LED green   | No action required                                                                  | LED yellow = resistance                   | Replace safety switch actuator (12.18 "Dismantling the door system (loading side)") | LED red = cable interrupted                      | Replace safety switch actuator, repair cable interruption | <p>Object in door</p> <p>Error Code 103</p> |
| <b>Cause:</b>                             | <b>Remedy:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| Safety relay ESR 1 is defective           | Replace ESR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| Relay ESR 1 LED green                     | No action required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| LED yellow = resistance                   | Replace safety switch actuator (12.18 "Dismantling the door system (loading side)")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| LED red = cable interrupted               | Replace safety switch actuator, repair cable interruption                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| 105                                       | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
|                                           | <p>The switch (S2) or the relay (K2) or the potentiometer value (R2) for Door US are not closed or have been opened while the program was running. Program is terminated with error display.</p> <p><b>Input</b> (S111), (R2) is monitored only while program is running</p> <p><i>Cause and remedy (see Error 101)</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p>Door is open</p> <p>Error Code 105</p>        |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
| 107                                       | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                  |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |
|                                           | <p>If the closure process with US Motor (M38) takes longer than 16 s until the upper switch (S2/K2) opens or the US potentiometer value (R2) is closed, the controller terminates the process with error display.</p> <p><b>Input</b> (S111), (R2) is monitored during the closure process.</p> <p><i>Cause and remedy (see Error 101)</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>Door does not close</p> <p>Error Code 107</p> |                |                                 |                    |                         |                                                                                     |                                           |                                                                                     |                                                  |                                                           |                                             |

| 108 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Display message                               |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
|     | <p>US safety switch actuator (S210) has been triggered. If during the closure process the safety switch actuator (S210) opens Relay ESR2, the controller terminates the closure process with error display and reopens with Motor (M38).</p> <p><b>Input</b> (S110), (R2) is monitored during the closure process.</p> <p><i>Cause and remedy (see Error 103)</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Object in door</p> <p>Error Code 108</p>   |
| 109 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Display message                               |
|     | <p>Communication between the processor and the interface (IPD) has been disrupted (see Chap. 3.3.6 "Independent content documentation system (IPD)").</p> <p><b>Cause:</b></p> <p>Additional PCB for door contact pressure is not working</p> <p>No Communication</p> <p>Supply voltage</p> <p><b>Remedy:</b></p> <p>Repair cable interruption, replace PCB</p> <p>Check bus address</p> <p>Check supply</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>No Communication</p> <p>Error Code 109</p> |
| 110 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Display message                               |
|     | <p>Pressure in washing system has dropped below minimum. If Switch (S211) is still open during the program 90 s after the filling phase, the controller terminates the current program with error display.</p> <p><b>Input</b> (S211) is monitored only with Utilities (M1-M4), (M7-M9), 90 s after the filling phase and at 85°C. Monitoring is inactive above 85°C.</p> <p><b>Cause:</b></p> <p>Wrong rotational direction of the circulation pump</p> <p>Foam formation</p> <p>Detergents connected wrongly</p> <p>No rack or wrong rack in the washing chamber</p> <p>Switch (S211) does not close (see Chap. 3.6.7 "Electrical function diagram")</p> <p><b>Remedy:</b></p> <p>Change rotational direction, exchange Phases 1 and 2.</p> <p>(See Chap. 6.10 "Configuration Module 1" Foam Control)</p> <p>Connect containers correctly</p> <p>Load correctly</p> <p>Replace</p> | <p>No pressure</p> <p>Error Code 110</p>      |
| 112 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Display message                               |
|     | <p>The system is leaking. If Switch (SB) in the floor pan closes for longer than 2 s, the controller terminates the current program with error display.</p> <p><b>Input</b> (SB) is monitored in "Program ready" mode.</p> <p><b>Cause:</b></p> <p>Electric circuit via Switch (SB) is not closed</p> <p>Leakage in the system</p> <p><b>Remedy:</b></p> <p>Repair interruption (8.2.2 "SB Floor pan leakage")</p> <p>Repair leakage, dry pan</p>                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>Leakage Pan</p> <p>Error Code 112</p>      |

| 113 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                               |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
|     | <p>If Switch (S109) is open for more than 4 s with 35 mm water column, the controller terminates the current program with error display.</p> <p><b>Input</b> Switch (S109) is monitored during Function (F1) in the program cycle with water (M1-M4), (M7) and (M9), and also in "Program ready" mode.</p> <p><b>Cause:</b><br/>Coarse or fine screen is clogged<br/><br/>Foam formation<br/><br/>Electric circuit via Switch (S109) is interrupted</p> <p><b>Remedy:</b><br/>Clean screens (see Chap. 12.8 "Cleaning fine screens and coarse screen")<br/><br/>(See Chap. 6.10.24 "Step Repetition (Foam control)")<br/><br/>Repair interruption</p>                                                                                                                                                                                                                                                    | <p>Screen clogged<br/>Error Code 113</p>      |
| 118 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                               |
|     | <p>No program recognition</p> <p>When automatic program recognition is activated, the switches are checked for function. If one of the switches (S101-S103) and (S106-S108) will not close, an error is displayed.</p> <p>When the LS door is open, all switches are monitored. When Switch (S105) is closed, Switches (S101-S103), (S106) and (S107) must have been closed at least once beforehand, otherwise an error is displayed.</p> <p><b>Cause:</b><br/>Rack not correctly inserted<br/><br/>Switch defective<br/><br/>No program recognition</p> <p><b>Remedy:</b><br/>Withdraw rack completely and insert again.<br/><br/>Check inputs of Switches S101-S103, S106, and S107 with magnet (see Chap. 6.6.7 "Input switching statuses S101-S106") and (Chap. 3.6.7 "Electrical function diagram")<br/><br/>Set program recognition to "off" (see Chap. 6.10.16 "Automatic rack recognition")</p> | <p>Program Recognition<br/>Error Code 118</p> |
| 121 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                               |
|     | <p>Level sensor is defective or not connected (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").</p> <p>If the level sensor (P1) is not closed for longer than 2 s (value between 0.2V and 4.5V), the controller terminates the current program with error display.</p> <p><b>The threshold values for Input (P1) are monitored during the program cycle.</b></p> <p><b>Cause:</b><br/>Level Sensor (P1) defective<br/>Electric circuit interrupted or not connected</p> <p><b>Remedy:</b><br/>Replace<br/>Check connection and electric circuit and repair if necessary</p>                                                                                                                                                                                                                                                                                                                           | <p>No water<br/>Error Code 121</p>            |

| 130 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Display message              |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
|     | <p>The washing chamber-floor temperature sensor is defective or not connected (value between 0°C and 150°C). The controller terminates the current program with error display (see Chap. 6.6.3 "Current values of temperature sensors 1-4").</p> <p><b>Cause:</b><br/>           Temperature sensor defective<br/>           Electric circuit interrupted or not connected</p> <p><b>Remedy:</b><br/>           Replace<br/>           Check connection and electric circuit and repair if necessary</p> <p><b>Checking resistance values</b><br/>           25°C = 10 000 KOhm<br/>           55°C = 2 989 KOhm<br/>           85°C = 1 070 KOhm</p> | NTC 1 def.<br>Error Code 130 |
| 131 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Display message              |
|     | <p>Dryer temperature sensor (NTC2) is defective or not connected (see Chap. 6.6.3 "Current values of temperature sensors 1-4").</p> <p><i>Cause and remedy see Error 130</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NTC 2 def.<br>Error Code 131 |
| 132 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Display message              |
|     | <p>Temperature sensor (NTC3) is defective or not connected (see Chap. 6.6.3 "Current values of temperature sensors 1-4").</p> <p><i>Cause and remedy see Error 130</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | NTC 3 def.<br>Error Code 132 |
| 133 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Display message              |
|     | <p>DI Boiler Temperature Sensor (NTC4) is defective or not connected (see Chap. 6.6.3 "Current values of temperature sensors 1-4").</p> <p><i>Cause and remedy see Error 130</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | NTC 4 def.<br>Error Code 133 |
| 134 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Display message              |
|     | <p>Washing Chamber-Floor Temperature Sensor (NTC5) is defective or not connected (see Chap. 6.6.4 "Current values of Temperature Sensors 5+6").</p> <p><i>Cause and remedy see Error 130</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NTC 5 def.<br>Error Code 134 |
| 135 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Display message              |
|     | <p>DI Boiler Temperature Sensor (NTC6) is defective or not connected (see Chap. 6.6.4 "Current values of Temperature Sensors 5+6").</p> <p><i>Cause and remedy see Error 130</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | NTC 6 def.<br>Error Code 135 |

| 140 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                                              |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|     | <p>DI Boiler Float Switch (SD) is still open after 15 minutes while filling is in process. No DI water supply to boiler (see also Chap. 8.2.4 "SD DI boiler float switch").</p> <p><b>Cause:</b></p> <p>DI water tap closed</p> <p>DI valve dirty or defective</p> <p>Float switch (SD) defective</p> <p>Threshold adjustment for DI water 10-45 minutes,</p> <p>Default setting = 15 minutes</p> <p><b>Remedy:</b></p> <p>Open DI water tap</p> <p>Clean or replace</p> <p>Replace</p> <p>(See Chap. 6.12 "Error threshold values (Limits Module)")</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>No DI water</p> <p>Error Code 140</p> <p>DI boiler SD</p> <p>15 min</p>   |
| 141 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                                              |
|     | <p>Operating level is not reached with CW during the filling process. No CW supply in the washing chamber, or switch (S1, S2) open.</p> <p>If, in the filling process with CW (Y11), Operating Level 2 of the level sensor (P1) is not reached within 5 minutes, the controller terminates the current program with error display (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").</p> <p><b>Threshold monitoring:</b> Only during the filling process until Operating Level 2 is reached.</p> <p>Threshold adjustment for cold water (see Chap. 6.12 "Error threshold values (Limits Module)").</p> <p>1-15 minutes, default setting = 5 minutes</p> <p><b>Cause:</b></p> <p>CW tap closed</p> <p>CW valve dirty or defective</p> <p>Level measurement system is leaking</p> <p>Switch (S110/S111) does not close</p> <p>Switch (S211) does not switch on</p> <p><b>Remedy:</b></p> <p>Open CW</p> <p>Clean or replace</p> <p>Check tubing</p> <p>Check door-switch and position</p> <p>Replace</p> | <p>No cold water</p> <p>Error Code 141</p>                                   |
| 142 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                                                              |
|     | <p>Operating level is not reached during the filling process. No warm water supply in the washing chamber, or switch (S1, S2) open.</p> <p>If, in the filling process with CW (Y12), Operating Level 2 of the level sensor (P1) is not reached within 5 minutes, the controller terminates the current program with error display (see Chap. 6.9.8 "Utility M2 Warm Water Step (WW)").</p> <p><b>Threshold monitoring:</b></p> <p>Threshold adjustment for warm water (see Chap. 6.12 "Error threshold values (Limits Module)").</p> <p>1-15 minutes, default setting = 5 minutes</p> <p><i>Cause and remedy (see Error 141)</i></p>                                                                                                                                                                                                                                                                                                                                                                     | <p>No warm water</p> <p>Error Code 142</p> <p>Warm water P1</p> <p>5 min</p> |

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| 148                                                       | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Display message |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|------------------------------|---------|-----------------------------------------------------------|---------------------|------------------------------|--------------------------|--------------------------------|----------------------------------------------------------------------------------------------|---------------|-------|-----------------------------------------|-------------------|-----------------------------------------------------------------------|
|                                                           | <p>Empty state monitor detects no change of level during wash chamber drainage.</p> <p>If the level does not drop to 0.7V (empty level +0.2V) within 3 minutes while drainage via drainage valve (Y31) or drainage pump is in process, the controller terminates the current process with error code (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").</p> <p><b>Threshold monitoring:</b> Only during drainage until empty level is reached.</p> <p>Threshold adjustment for drainage (see Chap. 6.12 "Error threshold values (Limits Module)").</p> <p>3-15 minutes, default setting = 3 minutes</p> <p><b>The relay for the circulation pump (K15) is stuck.</b></p> <p>If Switch (S211) is in closed state while the drainage phase (Y31 active) is under way, the process is interrupted and an error is displayed.</p> <p><b>Threshold monitoring:</b> 5 s after start of drainage.</p> <table><tr><td><b>Cause:</b></td><td><b>Remedy:</b></td></tr><tr><td>Switch (S211) remains closed</td><td>Replace</td></tr><tr><td>Electric circuit between controller and valve interrupted</td><td>Repair interruption</td></tr><tr><td>Relay (K31) does not respond</td><td>Replacing the controller</td></tr><tr><td>Drainage valve (Y31) defective</td><td>Check function by direct activation (Y31). Clean or replace (see Chap. 6.8 "Control Module")</td></tr><tr><td>Drain clogged</td><td>Clean</td></tr><tr><td>Contactor for circulation pump is stuck</td><td>Replace contactor</td></tr></table> | <b>Cause:</b>   | <b>Remedy:</b> | Switch (S211) remains closed | Replace | Electric circuit between controller and valve interrupted | Repair interruption | Relay (K31) does not respond | Replacing the controller | Drainage valve (Y31) defective | Check function by direct activation (Y31). Clean or replace (see Chap. 6.8 "Control Module") | Drain clogged | Clean | Contactor for circulation pump is stuck | Replace contactor | <p>No drain</p> <p>Error Code 148</p> <p>Drainage P1</p> <p>3 min</p> |
| <b>Cause:</b>                                             | <b>Remedy:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |
| Switch (S211) remains closed                              | Replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |
| Electric circuit between controller and valve interrupted | Repair interruption                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |
| Relay (K31) does not respond                              | Replacing the controller                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |
| Drainage valve (Y31) defective                            | Check function by direct activation (Y31). Clean or replace (see Chap. 6.8 "Control Module")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |
| Drain clogged                                             | Clean                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |
| Contactor for circulation pump is stuck                   | Replace contactor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                |                              |         |                                                           |                     |                              |                          |                                |                                                                                              |               |       |                                         |                   |                                                                       |

| 149 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Display message                             |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|     | <p>Level has dropped below minimum operating level during washing process. Water lost in the washing phase.</p> <p>If the level drops below the minimum level of 1 Volt for 15 s in the course of the washing cycle, the controller terminates the current process with error display (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").</p> <p><b>Threshold monitoring:</b> 5 s after start of washing.</p> <p><b>Cause:</b></p> <p>Drainage valve membrane soiled</p> <p>Exhaust air system has excessive suction power. Steam is withdrawn</p> <p>Exhaust flap remains open (stuck)</p> <p>Exhaust flap remains closed.</p> <p>Washing liquid is drained via Switch (S31) (see Chap. 3.6.7 "Electrical function diagram")</p> <p>Expanding air cannot escape</p> <p>Air presses back via the exhaust system</p> <p><b>Remedy:</b></p> <p>Clean or replace membrane (see Chap. 12.4 "Overview of maintenance intervals")</p> <p>Reduce the vacuum</p> <p>Repair exhaust flap</p> <p>Repair exhaust flap</p> <p>Check exhaust system</p> <p>Install motor-driven exhaust flap (see Chap. 6.11.15 "Potential-free output K28, K57 and K58")</p> | <p>Level too low</p> <p>Error Code 149</p>  |
| 150 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Display message                             |
|     | <p>Maximum level (water above edge of door) exceeded. Unwanted entry of water into the washing chamber (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)").</p> <p>If the level of 3.2V is exceeded for 3 s, the controller terminates the current process with error display.</p> <p>As long as the level is above 3.2V, the washing chamber doors remain locked.</p> <p><b>Threshold monitoring:</b> As long as the device is switched on</p> <p><b>Cause:</b></p> <p>Leaking water valves</p> <p>Switch (S211) does not switch on (see Chap. 3.6.7 "Electrical function diagram")</p> <p><b>Remedy:</b></p> <p>Replace water valves (see Chap. 12.4 "Overview of maintenance intervals")</p> <p>Replace</p>                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>Level too high</p> <p>Error Code 150</p> |

| 151                            | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Display message               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------|---------------------------|-------------------------------------------------|-------------------------------|----------------------------------------------------|----------------------------|---------|--------------------------------|------------------|-----------------------|------------------------|----------------------|------------------|-----------------------------------------|
|                                | <p>No dosage or too high dosage. Flow Meter 1 does not detect required impulses.</p> <p>If a dosage has been programmed in the step phase with Flow Meter 1, at least 10 impulses of the flow meter must be counted within 1 minute during dosing with Motor (M21), and at least X impulses for every further 6 seconds. Otherwise the controller terminates the current process with error display. The impulses in the dosing phase are monitored with a minimum flow rate of 8 Imp/s.</p> <p>Example:</p> <p>3610 = Impulses/l (value from controller after calibration of flow meter)</p> <p>77 = K (constant)</p> <p>3610 / 77 = 47</p> <p><b>Threshold monitoring:</b> During the whole cycle, even when dosing is not taking place.</p> <p><i>If the dosing pump button is pressed, the system switches to error!</i></p> <p>Not more than 6 impulses within 6 seconds are permissible for measurements in Flow Meter 1. Maximum dosage 500 ml.</p> <table><tr><td><b>Cause:</b></td><td><b>Remedy:</b></td></tr><tr><td>Wrong settings for dosing</td><td>Adjust settings (see Chap. 6.7 "Dosing module")</td></tr><tr><td>Flow meter dirty or defective</td><td>Clean or replace (see Chap. 12.13 "Dosing system")</td></tr><tr><td>Dosing pump tube defective</td><td>Replace</td></tr><tr><td>Dosing pump dirty or defective</td><td>Clean or replace</td></tr><tr><td>Wrong detergents used</td><td>Use correct detergents</td></tr><tr><td>Dosing pipes clogged</td><td>Clean or replace</td></tr></table> | <b>Cause:</b>                 | <b>Remedy:</b> | Wrong settings for dosing | Adjust settings (see Chap. 6.7 "Dosing module") | Flow meter dirty or defective | Clean or replace (see Chap. 12.13 "Dosing system") | Dosing pump tube defective | Replace | Dosing pump dirty or defective | Clean or replace | Wrong detergents used | Use correct detergents | Dosing pipes clogged | Clean or replace | <p>Wrong dosing</p> <p>D1 Error 151</p> |
| <b>Cause:</b>                  | <b>Remedy:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| Wrong settings for dosing      | Adjust settings (see Chap. 6.7 "Dosing module")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| Flow meter dirty or defective  | Clean or replace (see Chap. 12.13 "Dosing system")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| Dosing pump tube defective     | Replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| Dosing pump dirty or defective | Clean or replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| Wrong detergents used          | Use correct detergents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| Dosing pipes clogged           | Clean or replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| 152                            | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Display message               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
|                                | <p>Flow Meter 2</p> <p>See Error 151</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Wrong dosing</p> <p>D2</p> |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| 153                            | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Display message               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
|                                | <p>Flow Meter 3</p> <p>See Error 151</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Wrong dosing</p> <p>D3</p> |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
| 154                            | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Display message               |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |
|                                | <p>Flow Meter 4</p> <p>See Error 151</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>Wrong dosing</p> <p>D4</p> |                |                           |                                                 |                               |                                                    |                            |         |                                |                  |                       |                        |                      |                  |                                         |

| 161                                                                               | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Display message                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------|-------------------------|---------|-------------------|---------|--------------------------------------|---------------------------------|-----------------------------------------------------------------------------------|--------------------------|-----------------------------------------------|-------------|---------------------|---------------------------------|-----------------------------------|-------------------|----------------------------------|--------------------------------|--------------------------------------|
|                                                                                   | <p>Temperature sensor in the washing chamber detects no change during heating phase.</p> <p>If a minimum temperature change of 1 °C is not detected during the heating phase in the washing chamber (NTC1) within the specified time period (3 minutes), or if during the holding phase the temperature is no longer reached for more than 3 minutes, the controller terminates the current process with error display.</p> <p><b>Threshold monitoring:</b> During the heating and holding phase with water.</p> <table><tr><td><b>Cause:</b></td><td><b>Remedy:</b></td></tr><tr><td>Contact (K16) defective</td><td>Replace</td></tr><tr><td>Heating defective</td><td>Replace</td></tr><tr><td>Cable connections burnt or defective</td><td>Replace burnt cable connections</td></tr><tr><td>Drain valve membrane leaking (see Chap. 12.4 "Overview of maintenance intervals")</td><td>Clean / replace membrane</td></tr><tr><td>Safety temperature limiter has been triggered</td><td>Re-activate</td></tr><tr><td>No steam (building)</td><td>Check building steam connection</td></tr><tr><td>Suction unit excessively powerful</td><td>Reduce the vacuum</td></tr><tr><td>Exhaust flap always remains open</td><td>Clean or, if necessary, repair</td></tr></table> | <b>Cause:</b>                        | <b>Remedy:</b> | Contact (K16) defective | Replace | Heating defective | Replace | Cable connections burnt or defective | Replace burnt cable connections | Drain valve membrane leaking (see Chap. 12.4 "Overview of maintenance intervals") | Clean / replace membrane | Safety temperature limiter has been triggered | Re-activate | No steam (building) | Check building steam connection | Suction unit excessively powerful | Reduce the vacuum | Exhaust flap always remains open | Clean or, if necessary, repair | <p>No heat</p> <p>Error Code 161</p> |
| <b>Cause:</b>                                                                     | <b>Remedy:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| Contact (K16) defective                                                           | Replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| Heating defective                                                                 | Replace                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| Cable connections burnt or defective                                              | Replace burnt cable connections                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| Drain valve membrane leaking (see Chap. 12.4 "Overview of maintenance intervals") | Clean / replace membrane                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| Safety temperature limiter has been triggered                                     | Re-activate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| No steam (building)                                                               | Check building steam connection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| Suction unit excessively powerful                                                 | Reduce the vacuum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| Exhaust flap always remains open                                                  | Clean or, if necessary, repair                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
| 162                                                                               | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Display message                      |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |
|                                                                                   | <p>The temperature sensor in the DI boiler detects no change of temperature during the heating phase.</p> <p>If a minimum temperature change of 1 °C is not detected during the heating phase in the DI boiler (NTC4) within a specified time period (5 minutes), the controller terminates the current process with error display.</p> <p><b>Threshold monitoring:</b> During the heating and holding phase</p> <p><i>Causes and remedies see Error 161</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>No heat</p> <p>Error Code 162</p> |                |                         |         |                   |         |                                      |                                 |                                                                                   |                          |                                               |             |                     |                                 |                                   |                   |                                  |                                |                                      |

| 163 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                               |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
|     | <p>If the water temperature exceeds the target by 8°C in the water steps (M1-4), (M7), (M9), the controller terminates the current process with error display.</p> <p>If the (NTC1) target temperature is exceeded by 8°C during 1 minute while a water step is under way after completion of the filling process, the controller terminates the current process with error display (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)")</p> <p>If no temperature has been entered, monitoring is inactive. (Default setting = 0)</p> <p>A maximum water temperature of 45°C is permitted for the cold pre-rinse function. If this is exceeded, the controller terminates the current process with error display (see Chap. 6.9.16 "Function F1 - Pre Rinsing").</p> <p><b>Cause:</b></p> <p>Water utilities have been exchanged</p> <p>Program error of utility allocation</p> <p>Contactor (K16) is stuck</p> <p><b>Remedy:</b></p> <p>Connect water supplies correctly (see Chap. 3.6.6 "Connection diagrams")</p> <p>Check programs (see Chap. 11.5 "Allocation of the utilities")</p> <p>Replace</p> | <p>Water too Hot</p> <p>Error Code 163</p>    |
| 188 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                               |
|     | <p>No communication (see Chap. 6.11.20 "Activating Error 188").</p> <p><b>Cause:</b></p> <p>Interface PCB for in- and outputs defective</p> <p>Connector with loose contact</p> <p>Fuse defective</p> <p>Coding switch in wrong position (IPD PCB)</p> <p><b>Remedy:</b></p> <p>Replace Interface PCB (see Chap. 5.3 "Electro drawer with PCBs")</p> <p>Check connector</p> <p>Check fuse and replace if necessary</p> <p>Check coding switch and adjust correctly</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>No Communication</p> <p>Error Code 188</p> |
| 189 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display message                               |
|     | <p>No communication.</p> <p><b>Cause:</b></p> <p>IPD defective</p> <p>Connector with loose contact</p> <p>Fuse defective</p> <p>Coding switch in wrong position (IPD PCB)</p> <p><b>Remedy:</b></p> <p>Replace IPD (see Chap. 3.3.6 "Independent content documentation system (IPD)")</p> <p>Check connector</p> <p>Check fuse and replace if necessary</p> <p>Check coding switch and adjust correctly</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p>No Communication</p> <p>Error Code 189</p> |

| 190 | Error / cause / remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Display message                               |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
|     | <p>General communication problem of data connections to controllers due to voltage breakdown.</p> <p><b>Cause:</b></p> <p>Fuse of Door Contact Pressure PCB or Interface PCB defective (see Chap. 5.3 "Electro drawer with PCBs")</p> <p>Cable interrupted</p> <p>Connector with loose contact</p> <p>Coding switch in wrong position (IPD PCB)</p> <p><b>Remedy:</b></p> <p>Check and replace if necessary</p> <p>Locate cable interruption</p> <p>Check connector</p> <p>Check coding switch and adjust correctly</p> | <p>No Communication</p> <p>Error Code 190</p> |

## 11 Process data of factory programs

### 11.1 Process time

These process data are valid only for electrically heated devices without DI water pre-heating. The disinfection process can be shortened by approx. 14 minutes by use of DI water pre-heating.

### 11.2 Water and electric power consumption

Water consumption depends on rack, washing items and loading. As cold and warm water are mixed, the proportion of the latter depends on the supply temperatures of the different utilities.



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**Note**

If supply temperatures are low, the proportion of warm water is increased.

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The electric power consumption data (kWh) apply only to electrically heated models. They include pumps, ventilator and heat energy for device operation, from heating-up to the starting temperature to process fluid target temperature and air for drying. The energy content of warm water from the building is not included in energy balance calculations. In steam-heated versions, the energy portion for heating up the water does not apply.

### 11.3 Why self-disinfection?

Micro-organisms form in the washing chamber, tubing and DI boiler after a prolonged period not using the device. Following thermal disinfection step, residues of dead bacteria on the medical device may constitute a risk for patients.

In the case of **active** self-disinfection, the owner is requested to perform self-disinfection after a programmed period (24 hours as standard) following the last program run.



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**Note**

If there is no mains power (mains switch OFF), the timer is not active, therefore the request for "*Self Disinfection Start*" of the device is always displayed when the device is switched on and self-disinfection is active.

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## 11.4 Validated process parameters P1-P12

The 12 programs with specific program parameters, such as rinsing steps, dosage media concentrations, washing temperature and washing time, have been compiled with respect to the suitability of the dosing agents and the racks (instrument racks, OP shoes...). The procedures have been validated as device software and are supplied by the factory as ex-factory programs.



### Warning

Washing items must not be allowed to pass into the clean work area without going through washing and disinfection! It must be ensured that the complete program cycle has been run through without errors.



### Note

All program modifications must at all times be accessible to the technical service! All ex-factory programs have a thermal disinfection step, and processing of temperature-sensitive washing items is therefore not intended. Correct dosing pump function and allocation of chemicals must be ensured. Every program must be validated when taken into operation (see Chap. 2.5 "Process validation").

### 11.4.1 Deleting programs

Program deletion (see Chap. 6.9.3 "Allocation of the program library").



### Warning

Do not set programs inactive. Programs that are not used must be deleted completely! There is the risk of an unwanted program being selected with *"Automatic Program Recognition"*.

## 11.5 Allocation of the utilities



### Note

In the condenser option and DI water pre-heating option, the utilities must be re-allocated accordingly.

### 11.5.1 With condenser

In order to activate the condenser, Utility M6 "Condense" must be programmed instead of M5 "Dry". M6 opens the DI water valve (Y27) in addition to drying.

### 11.5.2 DI water pre-heating

Select M9 instead of M4 for Final Rinse. Preferably enter 95°C, holding time 0 minutes for thermal disinfection of the DI boiler. This reduces the heating up of the Final Rinse water in the washing chamber.


**Note**

Utilities M6 and M9 must always be included in the same program (M9 = Final rinse with pre-heated DI water, M6 = Condense).

### 11.5.3 Deactivating program steps

The second rinsing step can be deactivated with Function F0 (see Chap. 6.9.15 "Function F0 - inactive step").


**Warning**

Do not set programs inactive. Programs that are not used must be deleted completely! There is the risk of an unwanted program being selected with "Automatic Program Recognition" (see Chap. 11.4.1 "Deleting programs").

## 11.6 Overview of ex-factory programs

| Prog. No. | Program name                                     | Chemicals                                | Belimed detergents             |
|-----------|--------------------------------------------------|------------------------------------------|--------------------------------|
| P1        | Alkaline washing of anaesthetics material        | Alkaline chemicals                       | Beliclean 128                  |
| P2        | Mildly alkaline washing of anaesthetics material | Mildly alkaline chemicals<br>Neutraliser | Beliclean 201<br>Beliclean 205 |
| P3        | Alkaline washing of OP shoes                     | Alkaline chemicals                       | Beliclean 128                  |
| P4        | Alkaline washing of instruments                  | Alkaline chemicals                       | Beliclean 128                  |
| P5        | Alkaline intensive washing of instruments        | Alkaline chemicals                       | Beliclean 128                  |
| P6        | Highly alkaline washing of instruments           | Highly alkaline chemicals<br>Neutraliser | Beliclean 202<br>Beliclean 205 |
| P7        | Neutral washing of containers                    | Enzymatic chemicals                      | Belizym 203                    |
| P8        | Neutral washing of MIS instruments               | Enzymatic chemicals                      | Belizym 203                    |
| P9        | Alkaline washing of MIS instruments              | Alkaline chemicals                       | Beliclean 128                  |
| P10       | Alkaline washing of baby bottles                 | Alkaline chemicals                       | Beliclean 128                  |
| P11       | Highly alkaline washing of laboratory glassware  | Highly alkaline chemicals<br>Neutraliser | Beliclean 202<br>Beliclean 205 |
| P12       | Supplemental drying                              |                                          |                                |

(See Chap. 6.9.2 "Selecting Programs P1-P6 (Shift P7-P12)")

## 11.7 P1 Alkaline washing of anaesthetic material

|                                    |                                                                       |
|------------------------------------|-----------------------------------------------------------------------|
| <b>Indication / washing items:</b> | Anaesthetics material (tubes, material for artificial respiration...) |
| <b>Rack:</b>                       | Anaesthetic material                                                  |
| <b>Process description:</b>        | Alkaline washing with Thermal Disinfection $A_0 = 3000$               |
| <b>Chemicals:</b>                  | Beliclean 128                                                         |
| <b>Doser 1:</b>                    | Consumption = 200 ml/batch                                            |
| <b>Neutraliser:</b>                | -                                                                     |
| <b>Doser 2:</b>                    | -                                                                     |
| <b>Drying accelerator:</b>         | Belidry 604                                                           |
| <b>Doser 3:</b>                    | Consumption = 38 ml/batch                                             |
| <b>Electric power consumption:</b> | 10.1 kWh                                                              |

| Program Number 1: AN Material Alkaline |         |              |                |                  |              |                |                  |                     |
|----------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                           | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                        |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                       | CW      | -            | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                           | CW+WW   | 35           | 128/5 ml       | -                | 70           | -              | 5                | 18                  |
| <b>Rinse</b>                           | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                    | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                     | DI      | 93           | -              | $A_0=3000$       | -            | 604/1 ml       | 1                | 21                  |
| <b>Dry</b>                             | Air     | 120          | -              | 4                | 80           | -              | 16               | 21                  |
| <b>Total Program Time on average</b>   |         |              |                |                  |              |                |                  | <b>71</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 40         | -          | -             | <b>40</b>        |
| Clean               | 14         | 26         | -             | <b>40</b>        |
| Rinse               | -          | 38         | -             | <b>38</b>        |
| Second Rinse        | -          | 39         | -             | <b>39</b>        |
| Therm. Disinfection | -          | -          | 38            | <b>38</b>        |
| <b>Total</b>        | <b>54</b>  | <b>103</b> | <b>38</b>     | <b>195</b>       |

## 11.8 P2 Mildly alkaline washing of anaesthetics material

|                                    |                                                                       |
|------------------------------------|-----------------------------------------------------------------------|
| <b>Indication / washing items:</b> | Anaesthetics material (tubes, material for artificial respiration...) |
| <b>Rack:</b>                       | Anaesthetic material                                                  |
| <b>Process description:</b>        | Alkaline washing with Thermal Disinfection $A_0 = 3000$               |
| <b>Chemicals:</b>                  | Beliclean 201                                                         |
| <b>Doser 1:</b>                    | Consumption = 200 ml/batch                                            |
| <b>Neutraliser:</b>                | Beliclean 205                                                         |
| <b>Doser 2:</b>                    | Consumption = 75 ml/batch                                             |
| <b>Drying accelerator:</b>         | Belidry 604                                                           |
| <b>Doser 3:</b>                    | Consumption = 39 ml/batch                                             |
| <b>Electric power consumption:</b> | 10.0 kWh                                                              |

| Program Number 2: AN Material Mild Alkaline |         |              |                |                  |              |                |                  |                     |
|---------------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                                | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                             |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                            | CW      | -            | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                                | CW+WW   | 35           | 201/5 ml       | -                | 60           | -              | 7                | 19                  |
| <b>Rinse</b>                                | WW      | -            | 205/2 ml       | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                         | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                          | DI      | 93           | -              | $A_0=3000$       | -            | 604/1 ml       | 1                | 21                  |
| <b>Dry</b>                                  | Air     | 120          | -              | 4                | 80           | -              | 16               | 20                  |
| <b>Total Program Time on average</b>        |         |              |                |                  |              |                |                  | <b>71</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 40         | -          | -             | <b>40</b>        |
| Clean               | 15         | 25         | -             | <b>40</b>        |
| Rinse               | 38         | -          | -             | <b>38</b>        |
| Second Rinse        | -          | 39         | -             | <b>39</b>        |
| Therm. Disinfection | -          | -          | 39            | <b>39</b>        |
| <b>Total</b>        | <b>93</b>  | <b>64</b>  | <b>39</b>     | <b>196</b>       |

## 11.9 P3 Alkaline washing of OP shoes

|                                    |                                                               |
|------------------------------------|---------------------------------------------------------------|
| <b>Indication / washing items:</b> | OP shoes                                                      |
| <b>Rack:</b>                       | For OP shoes in 2 tiers basic rack                            |
| <b>Process description:</b>        | Highly alkaline washing with Thermal Disinfection $A_0 = 600$ |
| <b>Chemicals:</b>                  | Beliclean 128                                                 |
| <b>Doser 1:</b>                    | Consumption = 160 ml/batch                                    |
| <b>Neutraliser:</b>                | -                                                             |
| <b>Doser 2:</b>                    | -                                                             |
| <b>Drying accelerator:</b>         | Belidry 604                                                   |
| <b>Doser 3:</b>                    | Consumption = 29 ml/batch                                     |
| <b>Electric power consumption:</b> | 7.7 kWh                                                       |

| Program Number 3: OP Shoes Alkaline  |         |              |                |                  |              |                |                  |                     |
|--------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                         | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                      |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                     | CW      | -            | -              | 2                | -            | -              | -                | 4                   |
| <b>Clean</b>                         | CW+WW   | 35           | 128/5 ml       | -                | 70           | -              | 7                | 14                  |
| <b>Rinse</b>                         | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                  | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                   | DI      | 80           | 604/1 ml       | $A_0=600$        | -            | -              | -                | 21                  |
| <b>Dry</b>                           | Air     | 120          | -              | 4                | 80           | -              | 10               | 14                  |
| <b>Total Program Time on average</b> |         |              |                |                  |              |                |                  | <b>59</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 30         | -          | -             | <b>30</b>        |
| Clean               | 10         | 20         | -             | <b>30</b>        |
| Rinse               | -          | 29         | -             | <b>29</b>        |
| Second Rinse        | -          | 30         | -             | <b>30</b>        |
| Therm. Disinfection | -          | -          | 29            | <b>29</b>        |
| <b>Total</b>        | <b>40</b>  | <b>79</b>  | <b>29</b>     | <b>148</b>       |

## 11.10 P4 Alkaline washing of instruments

|                                    |                                                         |
|------------------------------------|---------------------------------------------------------|
| <b>Indication / washing items:</b> | Surgical instruments and examination instruments        |
| <b>Rack:</b>                       | Instruments 4 tiers, 12 DIN sieve trays 50 mm           |
| <b>Process description:</b>        | Alkaline washing with Thermal Disinfection $A_0 = 3000$ |
| <b>Chemicals:</b>                  | Beliclean 128                                           |
| <b>Doser 1:</b>                    | Consumption = 190 ml/batch                              |
| <b>Neutraliser:</b>                | -                                                       |
| <b>Doser 2:</b>                    | -                                                       |
| <b>Drying accelerator:</b>         | Belidry 604                                             |
| <b>Doser 3:</b>                    | Consumption = 38 ml/batch                               |
| <b>Electric power consumption:</b> | 10.2 kWh                                                |

| Program Number 4: Instruments Alkaline |         |              |                |                  |              |                |                  |                     |
|----------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                           | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                        |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                       | CW      | -            | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                           | CW+WW   | 35           | 128/5 ml       | -                | 70           | -              | 5                | 19                  |
| <b>Rinse</b>                           | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                    | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                     | DI      | 93           | 604/1 ml       | $A_0=3000$       | -            | -              | -                | 20                  |
| <b>Dry</b>                             | Air     | 120          | -              | 12               | -            | -              | -                | 13                  |
| <b>Total Program Time on average</b>   |         |              |                |                  |              |                |                  | <b>63</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 38         | -          | -             | <b>38</b>        |
| Clean               | 10         | 28         | -             | <b>38</b>        |
| Rinse               | -          | 37         | -             | <b>37</b>        |
| Second Rinse        | -          | 37         | -             | <b>37</b>        |
| Therm. Disinfection | -          | -          | 38            | <b>38</b>        |
| <b>Total</b>        | <b>48</b>  | <b>102</b> | <b>38</b>     | <b>188</b>       |

## 11.11 P5 Alkaline intensive washing of instruments

|                                    |                                                              |
|------------------------------------|--------------------------------------------------------------|
| <b>Indication / washing items:</b> | Surgical instruments and examination instruments             |
| <b>Rack:</b>                       | Instruments 4 tiers, 12 DIN sieve trays 50 mm                |
| <b>Process description:</b>        | Alkaline washing 90 °C with Thermal Disinfection $A_0 = 600$ |
| <b>Chemicals:</b>                  | Beliclean 128                                                |
| <b>Doser 1:</b>                    | Consumption = 185 ml/batch                                   |
| <b>Neutraliser:</b>                | -                                                            |
| <b>Doser 2:</b>                    | -                                                            |
| <b>Drying accelerator:</b>         | Belidry 604                                                  |
| <b>Doser 3:</b>                    | Consumption = 36 ml/batch                                    |
| <b>Electric power consumption:</b> | 9.9 kWh                                                      |

| Program Number 5: Instruments Intensive Alkaline |         |              |                |                  |              |                |                  |                     |
|--------------------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                                     | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                                  |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                                 | CW      | -            | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                                     | CW+WW   | 35           | 128/5 ml       | -                | 90           | -              | 4                | 23                  |
| <b>Rinse</b>                                     | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                              | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                               | DI      | 90           | 604/1 ml       | $A_0=600$        | -            | -              | -                | 18                  |
| <b>Dry</b>                                       | Air     | 120          | -              | 10               | -            | -              | -                | 4                   |
| <b>Total Program Time on average</b>             |         |              |                |                  |              |                |                  | <b>56</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 37         | -          | -             | <b>37</b>        |
| Clean               | 19         | 18         | -             | <b>37</b>        |
| Rinse               | -          | 37         | -             | <b>37</b>        |
| Second Rinse        | -          | 37         | -             | <b>37</b>        |
| Therm. Disinfection | -          | -          | 36            | <b>36</b>        |
| <b>Total</b>        | <b>56</b>  | <b>92</b>  | <b>36</b>     | <b>184</b>       |

## 11.12 P6 Highly alkaline washing of instruments

|                                    |                                                                |
|------------------------------------|----------------------------------------------------------------|
| <b>Indication / washing items:</b> | Surgical instruments and examination instruments               |
| <b>Rack:</b>                       | Instruments 4 tiers, 12 DIN sieve trays 50 mm                  |
| <b>Process description:</b>        | Highly alkaline washing with Thermal Disinfection $A_0 = 3000$ |
| <b>Chemicals:</b>                  | Beliclean 202                                                  |
| <b>Doser 1:</b>                    | Consumption = 180 ml/batch                                     |
| <b>Neutraliser:</b>                | Beliclean 205                                                  |
| <b>Doser 2:</b>                    | Consumption = 70 ml/batch                                      |
| <b>Drying accelerator:</b>         | Belidry 604                                                    |
| <b>Doser 3:</b>                    | Consumption = 35 ml/batch                                      |
| <b>Electric power consumption:</b> | 10.1 kWh                                                       |

| Program Number 6: Instruments Alkaline |         |              |                |                  |              |                |                  |                     |
|----------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                           | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                        |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                       | CW      | -            | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                           | CW+WW   | 35           | 202/5 ml       | -                | 70           | -              | 5                | 17                  |
| <b>Rinse</b>                           | WW      | -            | 205/2 ml       | 1                | -            | -              | -                | 4                   |
| <b>Second Rinse</b>                    | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                     | DI      | 93           | 604/1 ml       | $A_0=3000$       | -            | -              | -                | 19                  |
| <b>Dry</b>                             | Air     | 120          | -              | 12               | -            | -              | -                | 12                  |
| <b>Total Program Time on average</b>   |         |              |                |                  |              |                |                  | <b>60</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 36         | -          | -             | <b>36</b>        |
| Clean               | 9          | 27         | -             | <b>36</b>        |
| Rinse               | -          | 36         | -             | <b>36</b>        |
| Second Rinse        | -          | 35         | -             | <b>35</b>        |
| Therm. Disinfection | -          | -          | 35            | <b>35</b>        |
| <b>Total</b>        | <b>45</b>  | <b>98</b>  | <b>35</b>     | <b>178</b>       |

### 11.13 P7 Neutral washing of containers

|                                    |                                                               |
|------------------------------------|---------------------------------------------------------------|
| <b>Indication / washing items:</b> | 4 containers with 2 lids each                                 |
| <b>Rack:</b>                       | Container                                                     |
| <b>Process description:</b>        | Highly alkaline washing with Thermal Disinfection $A_0 = 600$ |
| <b>Chemicals:</b>                  | Beliclean 203                                                 |
| <b>Doser 1:</b>                    | Consumption = 175 ml/batch                                    |
| <b>Neutraliser:</b>                | -                                                             |
| <b>Doser 2:</b>                    | -                                                             |
| <b>Drying accelerator:</b>         | Belidry 604                                                   |
| <b>Doser 3:</b>                    | Consumption = 34 ml/batch                                     |
| <b>Electric power consumption:</b> | 7.2 kWh                                                       |

| Program Number 7: Containers Neutral |         |              |                |                  |              |                |                  |                     |
|--------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                         | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                      |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                     | CW      | -            | -              | 2                | -            | -              | -                | 3                   |
| <b>Clean</b>                         | CW+WW   | 40           | 203/5 ml       | 3                | 60           | -              | 5                | 15                  |
| <b>Rinse</b>                         | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                  | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                   | DI      | 90           | 604/1 ml       | $A_0=600$        | -            | -              | -                | 18                  |
| <b>Dry</b>                           | Air     | 120          | -              | 5                | -            | -              | -                | 7                   |
| <b>Total Program Time on average</b> |         |              |                |                  |              |                |                  | <b>49</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 33         | -          | -             | <b>33</b>        |
| Clean               | 3          | 32         | -             | <b>35</b>        |
| Rinse               | -          | 33         | -             | <b>33</b>        |
| Second Rinse        | -          | 33         | -             | <b>33</b>        |
| Therm. Disinfection | -          | -          | 34            | <b>34</b>        |
| <b>Total</b>        | <b>36</b>  | <b>98</b>  | <b>34</b>     | <b>168</b>       |

## 11.14 P8 Neutral washing of MIS instruments

|                                    |                                                                                            |
|------------------------------------|--------------------------------------------------------------------------------------------|
| <b>Indication / washing items:</b> | MIS instruments and accessories                                                            |
| <b>Rack:</b>                       | MIS                                                                                        |
| <b>Process description:</b>        | Neutral washing, washing and second rinse with DI water, Thermal Disinfection $A_0 = 3000$ |
| <b>Chemicals:</b>                  | Beliclean 203                                                                              |
| <b>Doser 1:</b>                    | Consumption = 135 ml/batch                                                                 |
| <b>Neutraliser:</b>                | -                                                                                          |
| <b>Doser 2:</b>                    | -                                                                                          |
| <b>Drying accelerator:</b>         | Belidry 604                                                                                |
| <b>Doser 3:</b>                    | Consumption = 28 ml/batch                                                                  |
| <b>Electric power consumption:</b> | 9.4 kWh                                                                                    |

| Program Number 8: MIS Instruments Neutral |         |              |                |                  |              |                |                  |                     |
|-------------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                              | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                           |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                          | CW      | -            | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                              | DI      | 40           | 203/5 ml       | 4                | 60           | -              | 3                | 18                  |
| <b>Rinse</b>                              | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                       | DI      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                        | DI      | 93           | 604/1 ml       | $A_0=3000$       | -            | -              | -                | 20                  |
| <b>Dry</b>                                | Air     | 120          | -              | 12               | -            | -              | -                | 12                  |
| <b>Total Program Time on average</b>      |         |              |                |                  |              |                |                  | <b>61</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 28         | -          | -             | <b>28</b>        |
| Clean               | -          | -          | 27            | <b>27</b>        |
| Rinse               | -          | 27         | -             | <b>27</b>        |
| Second Rinse        | -          | -          | 28            | <b>28</b>        |
| Therm. Disinfection | -          | -          | 28            | <b>28</b>        |
| <b>Total</b>        | <b>28</b>  | <b>27</b>  | <b>83</b>     | 138              |

## 11.15 P9 Alkaline washing of MIS instruments

|                                    |                                                                                    |
|------------------------------------|------------------------------------------------------------------------------------|
| <b>Indication / washing items:</b> | MIS instruments and accessories                                                    |
| <b>Rack:</b>                       | MIS                                                                                |
| <b>Process description:</b>        | Alkaline washing, second rinse with DI water, Thermal Disinfection<br>$A_0 = 3000$ |
| <b>Chemicals:</b>                  | Beliclean 128                                                                      |
| <b>Doser 1:</b>                    | Consumption = 165 ml/batch                                                         |
| <b>Neutraliser:</b>                | -                                                                                  |
| <b>Doser 2:</b>                    | -                                                                                  |
| <b>Drying accelerator:</b>         | Belidry 604                                                                        |
| <b>Doser 3:</b>                    | Consumption = 34 ml/batch                                                          |
| <b>Electric power consumption:</b> | 9.5 kWh                                                                            |

| Program Number 9: MIS Instruments Alkaline |         |              |                |                  |              |                |                  |                     |
|--------------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                               | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                            |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                           | CW      | -            | -              | 3                | -            | -              | -                | 4                   |
| <b>Clean</b>                               | CW+WW   | 35           | 128/5 ml       | -                | 70           | -              | 5                | 16                  |
| <b>Rinse</b>                               | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                        | DI      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                         | DI      | 93           | 604/1 ml       | $A_0=3000$       | -            | -              | -                | 21                  |
| <b>Dry</b>                                 | Air     | 120          | -              | 12               | -            | -              | -                | 13                  |
| <b>Total Program Time on average</b>       |         |              |                |                  |              |                |                  | <b>60</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 33         | -          | -             | <b>33</b>        |
| Clean               | 5          | 28         | -             | <b>33</b>        |
| Rinse               | -          | 33         | -             | <b>33</b>        |
| Second Rinse        | -          | -          | 33            | <b>33</b>        |
| Therm. Disinfection | -          | -          | 34            | <b>34</b>        |
| <b>Total</b>        | <b>38</b>  | <b>61</b>  | <b>67</b>     | 166              |

## 11.16 P10 Alkaline washing of baby bottles

|                                    |                                                         |
|------------------------------------|---------------------------------------------------------|
| <b>Indication / washing items:</b> | Baby bottles                                            |
| <b>Rack:</b>                       | For baby bottles and glass                              |
| <b>Process description:</b>        | Alkaline washing with Thermal Disinfection $A_0 = 3000$ |
| <b>Chemicals:</b>                  | Beliclean 128                                           |
| <b>Doser 1:</b>                    | Consumption = 150 ml/batch                              |
| <b>Neutraliser:</b>                | -                                                       |
| <b>Doser 2:</b>                    | -                                                       |
| <b>Drying accelerator:</b>         | Belidry 604                                             |
| <b>Doser 3:</b>                    | Consumption = 30 ml/batch                               |
| <b>Electric power consumption:</b> | 9.5 kWh                                                 |

| Program Number 10: Baby Bottles Alkaline |         |              |                |                  |              |                |                  |                     |
|------------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                             | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                          |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                         | CW      | 35           | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                             | CW+WW   | 35           | 128/5 ml       | -                | 70           | -              | 5                | 16                  |
| <b>Rinse</b>                             | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                      | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                       | DI      | 93           | -              | $A_0=3000$       | -            | -              | -                | 17                  |
| <b>Dry</b>                               | Air     | 120          | -              | 10               | -            | 604/1 ml       | 1                | 11                  |
| <b>Total Program Time on average</b>     |         |              |                |                  |              |                |                  | <b>55</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 12         | 18         | -             | 30               |
| Clean               | 15         | 15         | -             | 30               |
| Rinse               | -          | 30         | -             | 30               |
| Second Rinse        | -          | 30         | -             | 30               |
| Therm. Disinfection | -          | -          | 30            | 30               |
| <b>Total</b>        | <b>27</b>  | <b>93</b>  | <b>30</b>     | 150              |

## 11.17 P11 Alkaline intensive washing of laboratory glassware

|                                    |                                                        |
|------------------------------------|--------------------------------------------------------|
| <b>Indication / washing items:</b> | Laboratory glassware                                   |
| <b>Rack:</b>                       | For baby bottles and glass                             |
| <b>Process description:</b>        | Alkaline washing with Thermal Disinfection $A_0 = 600$ |
| <b>Chemicals:</b>                  | Beliclean 202                                          |
| <b>Doser 1:</b>                    | Consumption = 135 ml/batch                             |
| <b>Neutraliser:</b>                | Beliclean 205                                          |
| <b>Doser 2:</b>                    | Consumption = 54 ml/batch                              |
| <b>Drying accelerator:</b>         | Belidry 604                                            |
| <b>Doser 3:</b>                    | Consumption = 27 ml/batch                              |
| <b>Electric power consumption:</b> | 9.1 kWh                                                |

| Program Number 11: Laboratory Glassware Intensive Alkaline |         |              |                |                  |              |                |                  |                     |
|------------------------------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                                               | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                                            |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                                           | CW      | -            | -              | 3                | -            | -              | -                | 5                   |
| <b>Clean</b>                                               | CW+WW   | 35           | 128/5 ml       | -                | 80           | -              | 5                | 16                  |
| <b>Rinse</b>                                               | WW      | -            | 205/2 ml       | 1                | -            | -              | -                | 3                   |
| <b>Second Rinse</b>                                        | WW      | -            | -              | 1                | -            | -              | -                | 3                   |
| <b>Therm. Dis.</b>                                         | DI      | 80           | -              | $A_0=600$        | -            | -              | -                | 12                  |
| <b>Dry</b>                                                 | Air     | 120          | -              | 10               | -            | -              | 16               | 11                  |
| <b>Total Program Time on average</b>                       |         |              |                |                  |              |                |                  | <b>50</b>           |

| Program step        | Cold water | Warm water | DI warm water | Consumption/step |
|---------------------|------------|------------|---------------|------------------|
| Pre Rinse           | 27         | -          | -             | 27               |
| Clean               | 15         | 12         | -             | 27               |
| Rinse               | -          | 27         | -             | 27               |
| Second Rinse        | -          | 27         | -             | 27               |
| Therm. Disinfection | -          | -          | 27            | 27               |
| <b>Total</b>        | <b>42</b>  | <b>66</b>  | <b>27</b>     | 135              |

## 11.18 P12 Supplemental drying

**Indication / washing items:** -  
**Rack:** -  
**Process description:** Supplementary drying for 5 minutes at 120 °C  
**Chemicals:** -  
**Doser 1:** -  
**Neutraliser:** -  
**Doser 2:** -  
**Drying accelerator:** -  
**Doser 3:** -  
**Electric power consumption:** 9.5 kWh

| Program Number 12: Laboratory Glassware Intensive Alkaline |         |              |                |                  |              |                |                  |                     |
|------------------------------------------------------------|---------|--------------|----------------|------------------|--------------|----------------|------------------|---------------------|
| Program step                                               | Utility | Phase 1      |                |                  | Phase 2      |                |                  | Step duration [Min] |
|                                                            |         | Temp. 1 [°C] | Product/dosage | Duration 1 [Min] | Temp. 1 [°C] | Product dosage | Duration 2 [Min] |                     |
| <b>Pre Rinse</b>                                           | CW      | -            | -              | -                | -            | -              | -                | -                   |
| <b>Clean</b>                                               | CW+WW   | -            | -              | -                | -            | -              | -                | -                   |
| <b>Rinse</b>                                               | WW      | -            | -              | -                | -            | -              | -                | -                   |
| <b>Second Rinse</b>                                        | WW      | -            | -              | -                | -            | -              | -                | -                   |
| <b>Therm. Dis.</b>                                         | DI      | -            | -              | -                | -            | -              | -                | -                   |
| <b>Dry</b>                                                 | Air     | 120          | -              | 5                | -            | -              | -                | 5                   |
| <b>Total Program Time on average</b>                       |         |              |                |                  |              |                |                  | <b>5</b>            |

## 12 Maintenance

### 12.1 Maintenance in general

The technical service is responsible for carrying out the periodic maintenance tasks.

**Note**

We recommend to make use of the Belimed customer service for all maintenance and repair work.

Maintenance tasks which have been completed must be documented in the inspection and maintenance booklet included in delivery.

**Danger**

Switch off at the main switch prior to performing all maintenance work.

Only carry out maintenance and cleaning work with safety goggles and gloves! Contamination residues can cause infections!

**Warning**

Only carry out maintenance and cleaning work after the device has been allowed to cool.

**Caution**

Never spray the device for cleaning. The device is not waterproof.

Only use chrome steel cleaning agents or surface disinfectants for cleaning the outside of the device. **No solvents!**

### 12.2 Replacing the controller

The Processor PCB is supplied without software. This must be loaded using the CADI PC software (see Chap. 9 "Downloading the control software"). If the data are lost, the device must be reconfigured.

**Caution**

When the Processor PCB is replaced, all data, such as date of manufacture, batch counter, program data and setup settings, are lost as well.

## 12.3 Error code and batch number statistics

We recommend annual recording of the statistics of the last ten error codes and batch numbers. This overview facilitates error analysis for the service technician. With "CADI for ECU", the controller can be accessed directly from a PC via a zero modem cable.

**CADI for ECU - [Analysis]**

File Washer Options Window ?

Analog Digital Statistics User Defined Edit

**Batch Counter**

P1:  P2:  P3:  P4:   
P5:  P6:  P7:  P8:   
P9:  P10:  P11:  P12:   
Total Batches:

**Last 10 Errors**

| Nr | Code | Prog | Step | Date | Time |
|----|------|------|------|------|------|
| 1  |      |      |      |      |      |
| 2  |      |      |      |      |      |
| 3  |      |      |      |      |      |
| 4  |      |      |      |      |      |
| 5  |      |      |      |      |      |
| 6  |      |      |      |      |      |
| 7  |      |      |      |      |      |
| 8  |      |      |      |      |      |
| 9  |      |      |      |      |      |
| 10 |      |      |      |      |      |

**Operating Hours Air Filter**

h

No Connection To ECU

- In CADI, open *Washer/View Analyses*
- Select the *"Statistics"* window
- Save data on the PC with *File/Save*, or print with *File/Print*

## 12.4 Overview of maintenance intervals

Belimed recommends the following maintenance intervals:

| Maintenance area           | Note                              | Checkup  |             |        |          | Procedure |       |         |
|----------------------------|-----------------------------------|----------|-------------|--------|----------|-----------|-------|---------|
|                            |                                   | Function | Cleanliness | Visual | No leaks | Adjust    | Clean | Replace |
| Device from outside        |                                   |          |             |        |          |           |       |         |
| Warning notices            | Readability                       |          |             | 1      |          |           |       | B       |
| Power rating plate         | Readability                       |          |             | 1      |          |           |       | B       |
| Installation area          |                                   |          |             |        |          |           |       |         |
| Exhaust flap               |                                   | 2        |             |        |          |           |       |         |
| Pre shut-off valve         |                                   | 2        |             |        |          |           |       |         |
| Steam pipe pre-filter      |                                   | 2        |             |        |          |           | 2     |         |
| Coarse filter for water    |                                   | 2        |             |        |          |           | 2     |         |
| Water intake               |                                   |          |             |        |          |           |       |         |
| Valves                     | Correct closure                   | 1        |             |        |          |           | B     | B       |
| Pre-filter                 | Flow rate                         | 1        |             |        |          |           | 2     |         |
| DI water filling time      | 8 litres / minute                 | 1        |             |        |          |           |       |         |
| Washing system             |                                   |          |             |        |          |           |       |         |
| Washing arms               | Wear-out of rotor bearing         | 1        | 1           | 1      |          |           |       | B       |
| Plastic parts              | Brittle rollers on racks          | 1        |             | 1      |          |           |       | B       |
| Docking                    | Stuck                             | 1        | 1           |        |          | 2         |       |         |
| Circulation pump           | Measure performance (A)           | 1        |             |        | 1        |           |       |         |
| Bleeder                    | EPDM DN 50 membrane               | 1        |             |        | 1        |           | 1     | B       |
| Clamp connections          | Torque                            |          |             |        | 1        | 1         |       | 2       |
| EPDM tube                  | Formed tube                       |          |             | 1      |          |           |       | 2       |
| Water temperature sensor   | Calibrate                         | 1        | 1           | 1      |          | 2         |       | B       |
| Electric heating           | Contact K16                       | 1        |             | 1      |          |           |       | B       |
| Steam heating              | Steam valve 50 Hz                 | 1        |             |        |          |           |       | B       |
| Dosing system              |                                   |          |             |        |          |           |       |         |
| Dosing pump tubes          | Pharmed                           | 1        |             | 1      | 1        |           |       | 1       |
| Calibration of flow meters |                                   | 1        |             |        |          | 1         |       |         |
| Detergent supply tubing    | Niflex tube                       | 1        |             |        | 1        |           |       | 2       |
| Drying system              |                                   |          |             |        |          |           |       |         |
| Ventilator                 | Measure performance (A)           | 2        |             |        |          |           | 2     |         |
| Fine filter                | Period of operation approx. 500 h | 1        |             | 1      |          |           |       | 1       |
| Pre-filter                 | Period of operation approx. 300 h | 1        | 1           | 1      | 1        |           | 1     | 2       |
| Heating                    | Measure performance (A)           | 1        |             | 2      |          |           | 2     |         |
| Non-return valve           | Seal                              | 1        | 1           | 1      | 1        |           | 2     | B       |
| Air temperature sensor     | Check connector                   | 1        |             | 1      |          |           |       | B       |

| Maintenance area        | Note                          | Checkup  |             |        |          | Procedure |       |         |
|-------------------------|-------------------------------|----------|-------------|--------|----------|-----------|-------|---------|
|                         |                               | Function | Cleanliness | Visual | No leaks | Adjust    | Clean | Replace |
| Door system             |                               |          |             |        |          |           |       |         |
| Door seal               | Silicone foam profile 5.5 m   | 1        | 1           | 1      | 1        | 1         | 1     | B       |
| Drive systems           | Plug-in connections           | 1        |             |        |          | 1         |       |         |
| Safety switch actuator  | Cut injuries                  | 1        | 1           | 1      |          |           |       | B       |
| Readjust door clearance | Max. 2 mm                     | 1        |             |        |          | 1         |       |         |
| Calibrate door setting  |                               |          |             |        |          | 1         |       |         |
| Electrical installation |                               |          |             |        |          |           |       |         |
| Clamps, contacts        | Retighten contacts            | X        |             | 1      |          |           |       |         |
| Racks                   |                               |          |             |        |          |           |       |         |
| Washing arm bearing     | Check for wear                | 1        | 1           |        |          | B         | 1     | B       |
| Washing arms            | Washing arms rotation checkup | 1        |             |        |          |           |       |         |
| Condition of rack       |                               | 1        |             | 1      |          |           |       |         |
| Nozzles                 | Clogging                      | 1        |             | 1      |          |           | 1     |         |
| Magnets                 |                               | 1        |             |        |          |           |       | B       |
| Program pre-selection   | Correct program               | 1        |             |        |          | 1         |       |         |
| Test sensors            |                               | 1        |             |        |          | 1         |       | B       |
| Rack drive system       |                               |          |             |        |          |           |       |         |
| Chain                   | Readjust tension              | 1        |             |        |          | 1         |       |         |
| Rack position           |                               | 1        |             |        |          | 1         |       |         |
| Drive rollers           |                               | 1        |             |        |          |           |       | B       |
| Height adjustment       | Loading table                 | 1        |             |        |          | 1         |       |         |

Legend:

1 = after every 1500 batches or at least once a year when maintenance is performed

2 = after every 3000 batches or at least every 2 years

B = as needed

(See also Chap. 6.10.3 "Maintenance (batch number)")

## 12.5 Spare parts for maintenance

The following spare parts are used for general maintenance. These must always be obtained from the manufacturer!

|        |                                          |
|--------|------------------------------------------|
| 21603  | Solenoid valve, single, 24V DN20         |
| 804365 | Rotor bearing                            |
| 57139  | Washing arm                              |
| 57193  | Spacer disk for washing arm              |
| 73713  | Rack roller                              |
| 43059  | Formed tube for upper washing arm        |
| 46442  | Temperature sensor NTC                   |
| 25120  | Temperature limiter, 3-pin, 165°C        |
| 20256  | 2/2 Solenoid valve - steam 1/2" 24V 50Hz |
| 48147  | Pharmed tube                             |
| 78081  | Flow meter with cable 0.8m               |
| 06605  | Nyflex tube, transparent D5/11           |
| 77317  | Fine filter                              |
| 74422  | Pre-filter                               |
| 66086  | Seal for non-return valve                |
| 46457  | Air temperature sensor NTC2              |
| 685765 | Silicone foam profile 5.5 m              |
| 73046  | Safety switch actuator                   |
| 684094 | Magnet for rack coding                   |
| 73470  | Reed sensor                              |
| 76713  | Rubberised drive roller                  |

### Recommended spare parts:

|       |                                              |
|-------|----------------------------------------------|
| 84000 | ECU 2000 processor card                      |
| 73240 | PCB for door contact pressure (linear drive) |
| 76539 | Level sensor                                 |
| 73469 | Linear drive 24V DC                          |



### Note

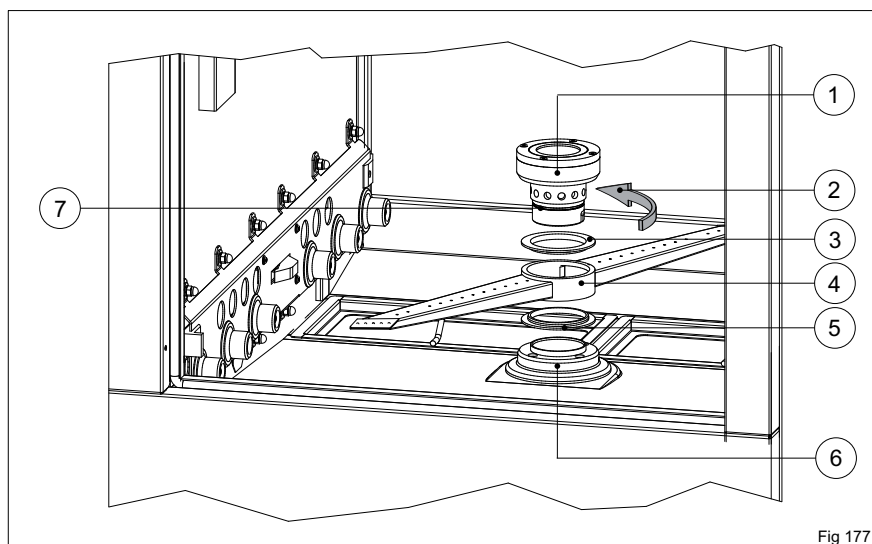
Label and return replaced components to the manufacturer (see Chap. 15 "Organisation Belimed AG") or dispose of in accordance with local laws and regulations.

## 12.6 Maintenance of the bottom washing arm



### Warning

Pointed or sharp objects can cause injuries when cleaning the device.



- 1 Clamping fixture
- 2 Direction of rotation for loosening
- 3 Top bearing bush
- 4 Bottom washing arm
- 5 Bottom bearing bush
- 6 Supporting bearing
- 7 Sealing O-ring for clamping fixture

- ▶ Twist the clamping fixture (Fig. 177 Pos.1) counter-clockwise and pull it upwards
- ▶ Disassemble the remaining components acc. to Fig. 177
- ▶ Check the seal on the clamping fixture (Fig. 177 Pos.7) for damage
- ▶ Check the washing arm (Fig. 177 Pos.4) for clogged nozzles and clean as required
- ▶ Clean the bearing bushes (Fig. 177 Pos.3+5), check for wear and replace as required  
Replacement criteria: Score marks or deep scratches
- ▶ Reassemble components



### Caution

Rinsing nozzles must be facing upwards!

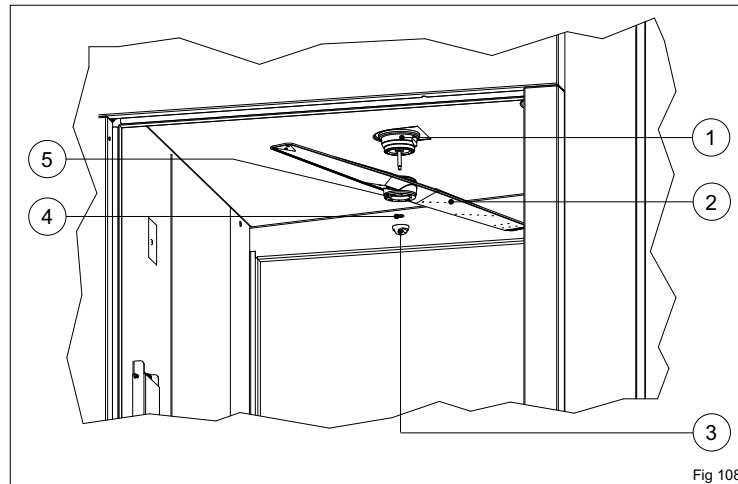
- ▶ Check rotation of the washing arm

## 12.7 Maintenance of the top washing arm

**Warning**

Pointed or sharp objects can cause injuries when cleaning the device.

The washing arm must be checked daily and clogged nozzles cleaned.



- 1 Washing arm sleeve
- 2 Top washing arm
- 3 Cap nut
- 4 Slide ring
- 5 Rotor bearing

► Loosen cap nut (Fig. 108 Pos.5)

**Note**

Do not lose the spacer disc (Fig. 108 Pos.4)!

- Disassemble the components acc. to Fig. 108
- Check the washing arm (Fig. 108 Pos.2) for clogged nozzles and clean as required
- Check the rotor bearing (Fig. 108 Pos.5) for wear and replace as required  
Replacement criteria: Score marks or deep scratches
- Reassemble components
- Check rotation of the washing arm

## 12.8 Cleaning fine screens and coarse screen

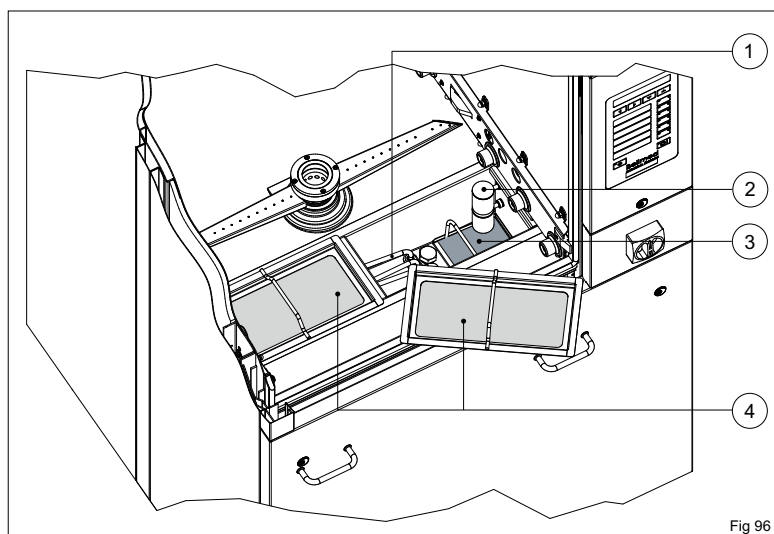
**Warning**

Pointed or sharp objects can cause injuries when cleaning the device.

- ▶ Remove fine screens (Fig. 96 Pos.4) and clean as required
- ▶ Remove coarse screen (Fig. 96 Pos.3) and clean as required

**Caution**

The tank heating elements can be very hot!



- 1 Tank heating elements
- 2 Level floats
- 3 Coarse screen
- 4 Surface sieve

- ▶ Remove foreign objects from washing chamber
- ▶ Reinsert coarse screen correctly
- ▶ Reinsert fine screens correctly

**Caution**

Never run wash programs without the coarse and fine screens in place!

## 12.9 Cleaning the water intake pre-filter

**Warning**

Only carry out maintenance and cleaning work after the device has been allowed to cool.

- ▶ Dismantle armoured tube at the valve (Fig. 243 Pos.1)
- ▶ Pull out pre-filter and clean (Fig. 243 Pos.4)

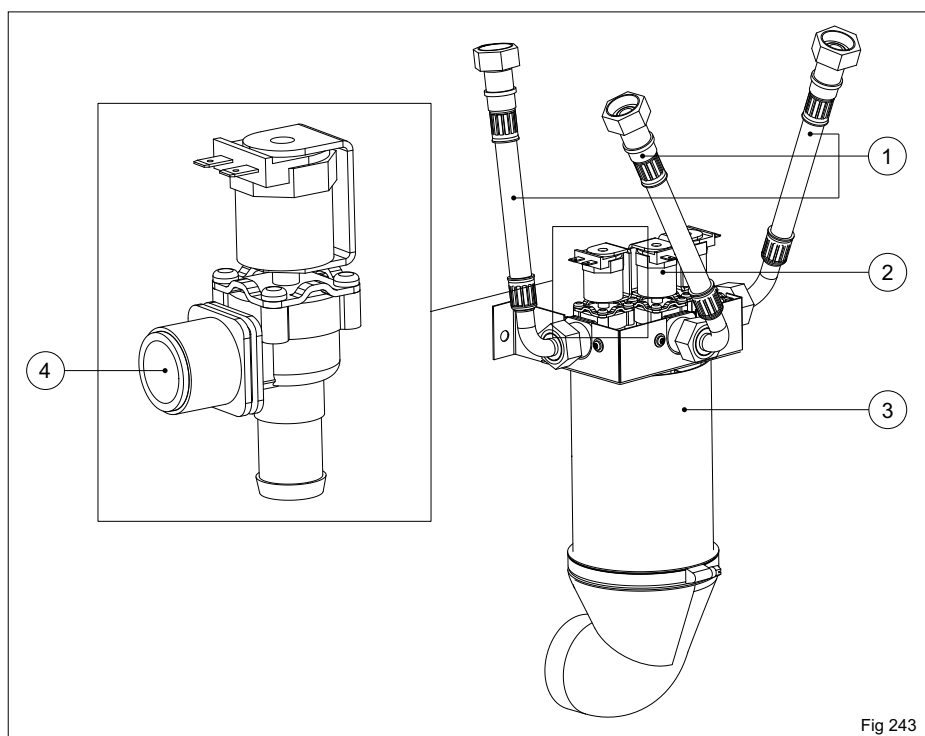


Fig 243

- 1 Armoured tubes CW, WW, DI
- 2 Three water valves
- 3 Free flow passage
- 4 Pre-filter

**Note**

DI water filling time to calibration point must not exceed 2 minutes. Minimum 8 l/min (see Chap. 6.9.7 "Utility M1 Cold Water Step (CW)") and (12.4 "Overview of maintenance intervals").

## 12.10 Tube clamps

- Check tube clamps for tightness and retighten as required



### Warning

Replace over-wound or defective buckles as well as brittle EPDM tube buckles immediately!

## 12.11 Heating elements / dryer

- Check capillary tubes of safety temperature limiter (F16) for breakage
- Check screw-in or plug-in contacts on electrical heaters for discolouration and replace as required.



### Caution

Screw-in and plug-in contacts must be clean and the contact surfaces must be free of contaminations.

## 12.12 Steam heating



### Caution

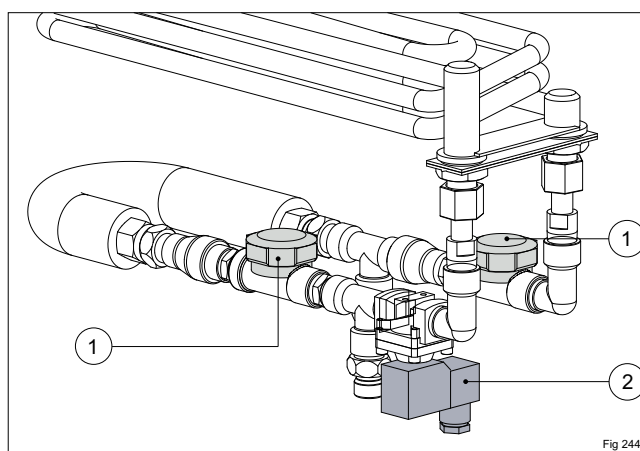
Do not loosen any screw connections at high temperatures. The threads may possibly be damaged.

- Check steam heating system (Fig. 244) for leaks. Replace defective components and their respective seals immediately
- Clean outside of solenoid valve (Fig. 244 Pos.2) and check for visible cracks
- Check seals of condensed water drain (Fig. 244 Pos.1) and replace as required



### Warning

Do not isolate the condensed water drain!



- 1 Condensed water drain  
2 Solenoid valve

## 12.13 Dosing system



### Warning

Wearing protective goggles and gloves is compulsory when handling detergents of any kind!

Detergent manufacturer safety instructions must always be followed!

- ▶ Check function of dosing system (leaks, precision)
  - ▶ Check buckle connections on tubes for tightness
  - ▶ Replace hard or brittle intake tubes
- Further information (see also Chap. 6.7 "Dosing module")

### 12.13.1 Peristaltic tubes for peristaltic pumps



### Note

Replace peristaltic tubes each time when servicing. Belimed recommends replacement at least after 8 months.



### Caution

Use correct material! Use of the wrong tubing material with the respective detergents can lead to failure.

Belimed recommends:

| Material | Application with detergents                                  |
|----------|--------------------------------------------------------------|
| Pharmed  | General chemicals, disinfectant, neutraliser, peracetic acid |
| Tygon    | Instrument milk                                              |
| Silicone | Wetting agents, drying facilitators, general chemicals       |
| Viton    | Special agents in pharmaceutical industry, instrument milk   |

## 12.14 Drying system

### 12.14.1 Air tubes



#### Warning

Only carry out maintenance and cleaning work after the device has been allowed to cool.

- Check air tubes (Fig. 366 Pos.1+6) for visible cracks and injuries

### 12.14.2 Pre-filter and fine filter (HEPA)

- Replace pre-filter (Fig. 366 Pos.4) after approx. 300 hours of operation or if badly contaminated
- Replace fine filter (Fig. 366 Pos.3) after approx. 500 hours of operation or if small cracks have appeared (see also Chap. 6.6.20 "Hours of operation of air filter")



#### Note

Belimed recommends replacing the fine filter once a year.

Make sure the arrow on the fine filter points in the right direction! Do not touch the filter paper! Set the operating hour-meter on zero (see also Chap. 6.10.4 "Ventilator operating hours (cumulative sum of drying time)").

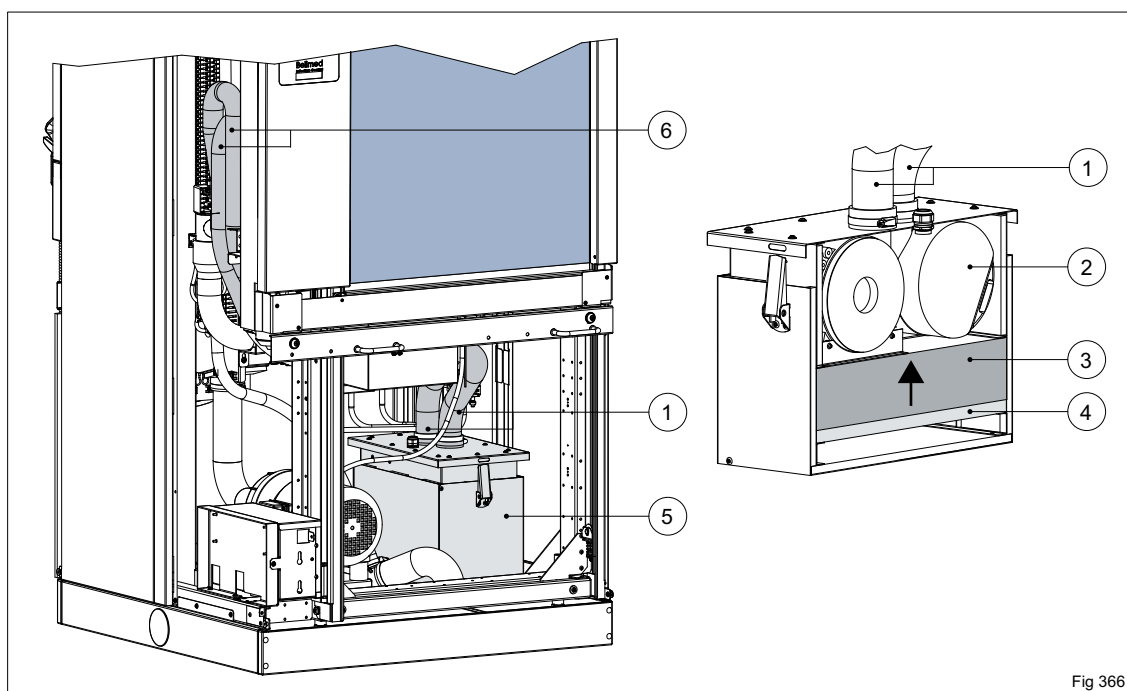


Fig 366

- 1 Bottom air tube
- 2 Dryer fan
- 3 Fine filter
- 4 Pre-filter
- 5 Dryer casing
- 6 Top air tube

### 12.14.3 Non-return valve

**Warning**

Only carry out maintenance and cleaning work after the device has been allowed to cool.

- ▶ Dismantle air tube (Fig. 171 Pos.1) and formed tube (Pos.2)
- ▶ Unscrew locking screw (Pos.3) and dismantle complete valve body
- ▶ Inspect seal (Pos.6) for dirt or cracks and replace if necessary
- ▶ Test function of compression spring (Pos.4) and check for breakages, replace if necessary

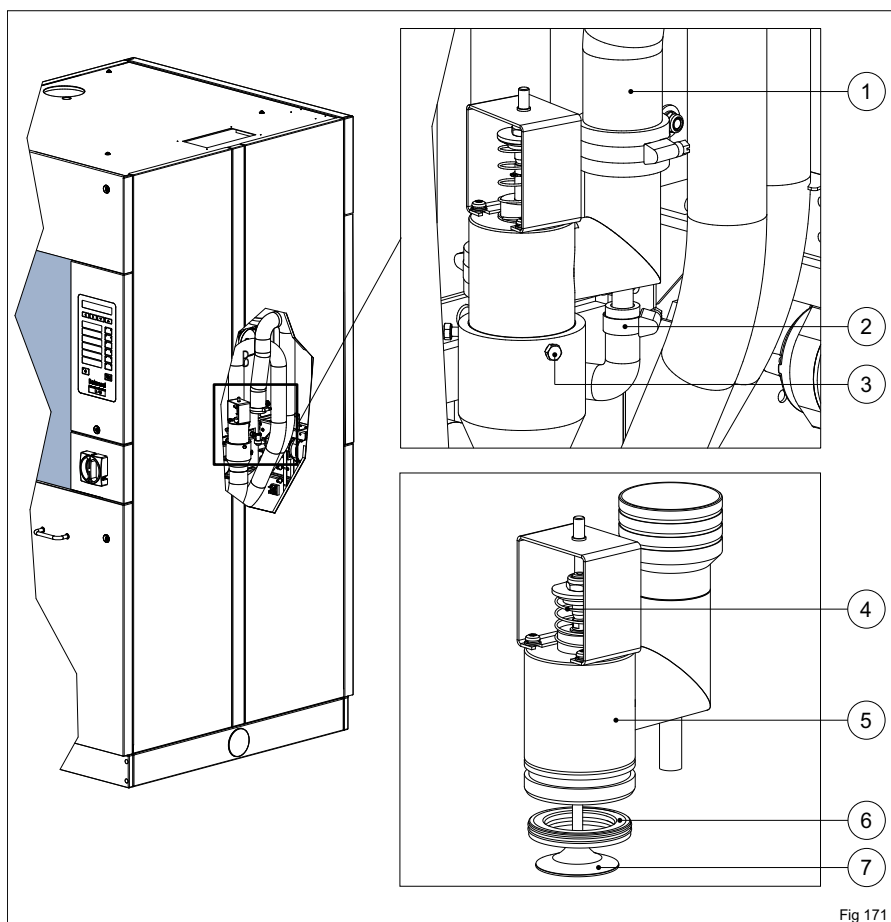


Fig 171

- 1 Air tube
- 2 Formed tube
- 3 Valve body locking screw
- 4 Compression spring
- 5 Valve body
- 6 Seal for non-return valve
- 7 Valve tappet

### 12.14.4 Differential pressure (optional)

The air filters have a differential pressure of 1.4 kPa. If the differential pressure increases to approx. 1.7 kPa (17mbar) or higher, Error "*Replace Filter*" is triggered.



#### Note

Depending on the exhaust system, the pressure point must be determined again. Cover 50% of the filter with paper. Adjust the differential pressure switch until the switching point is reached and the message "*Replace Filter*" appears. Remove paper.

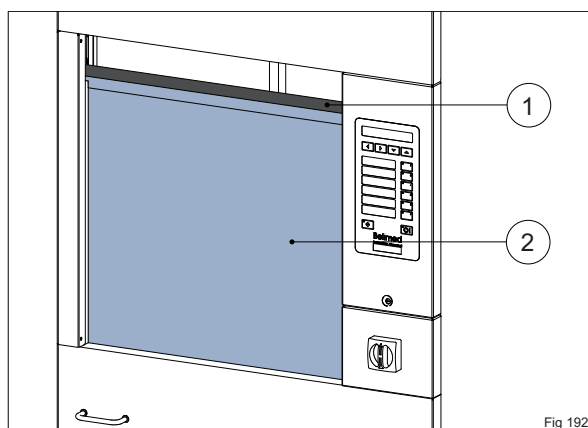
## 12.15 Door system

### 12.15.1 Safety switch actuator



#### Warning

Replace safety switch actuator (Fig. 192 Pos.1) with cut injuries immediately.



- 1 Safety switch actuator
- 2 Washing chamber door

#### Function test

- ▶ Close door (Fig. 192 Pos.2) using button
- ▶ Touch safety switch actuator (Fig. 192 Pos.1)
- ▶ Door is lowered
- ▶ An acoustic signal is sounded
- ▶ Error message 108 (see Chap. 10.3 "Error display / error code table / cause and remedy")

### 12.15.2 Replacing the door seal

Door seals must be intact and undamaged. Seals which have been cut or broken out must be replaced immediately.

**Warning**

Only carry out maintenance and cleaning work after the device has been allowed to cool.

**Note**

Clean door seals using a mild detergent and apply silicone grease for protection.

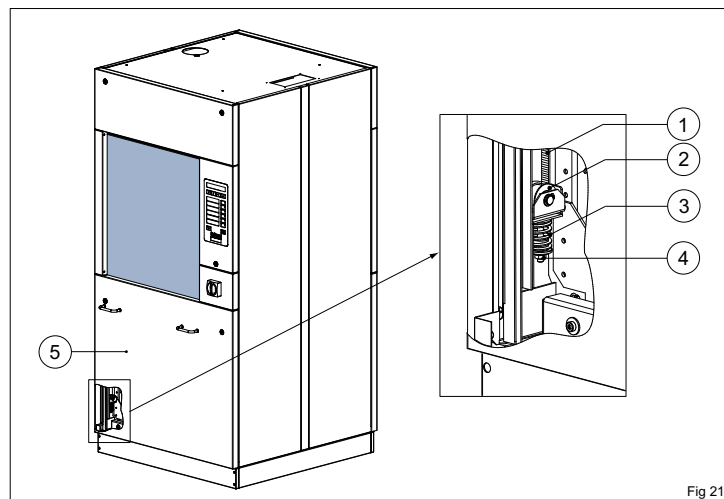
- ▶ Remove seal and glue residues from the u-section using a screwdriver. Clean u-section thoroughly!
- ▶ Apply silicone glue continuously to the inside along the whole u-section.
- ▶ Insert door seal and bring together at the top. Do not stretch! Close door and allow to dry for at least 24 h.

### 12.15.3 Retighten door belt

**Caution**

Door belt (Fig. 213 Pos.1) must not slip on the tensioning pulley (Fig. 213 Pos.2). Danger of premature wear!

- ▶ Remove front panel (Fig. 213 Pos.5)
- ▶ Retighten door belt via nut (Fig. 213 Pos.4).



- 1 Door belt
- 2 Bottom tensioning pulley
- 3 Compression spring for door tensioner
- 4 Hexagonal nut 4301 M6
- 5 Lower front panel

### 12.15.4 Vertical door movement

If the limit is overstepped, the motor cannot release itself any more. Release door conventionally and readjust.



#### Caution

Danger of collision at door setting (Fig. 194) between belt bracket (Fig. 194 Pos.3) and door frame (Fig. 194 Pos.1).

Danger of collision between washing chamber door (Fig. 194 Pos.6), drip tray (Fig. 194 Pos.5) and drip panel (Fig. 194 Pos.7).

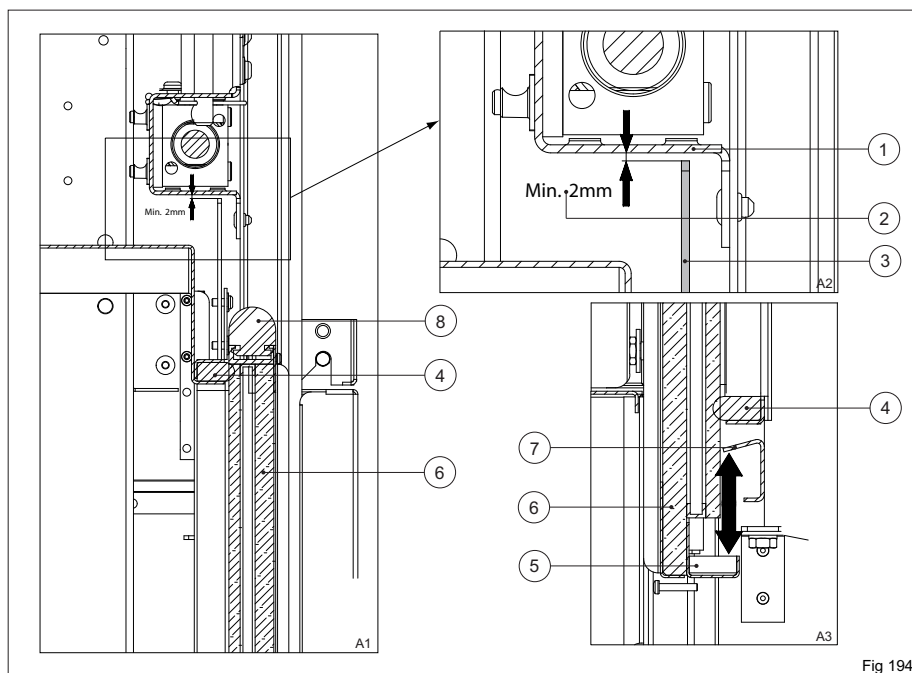


Fig 194

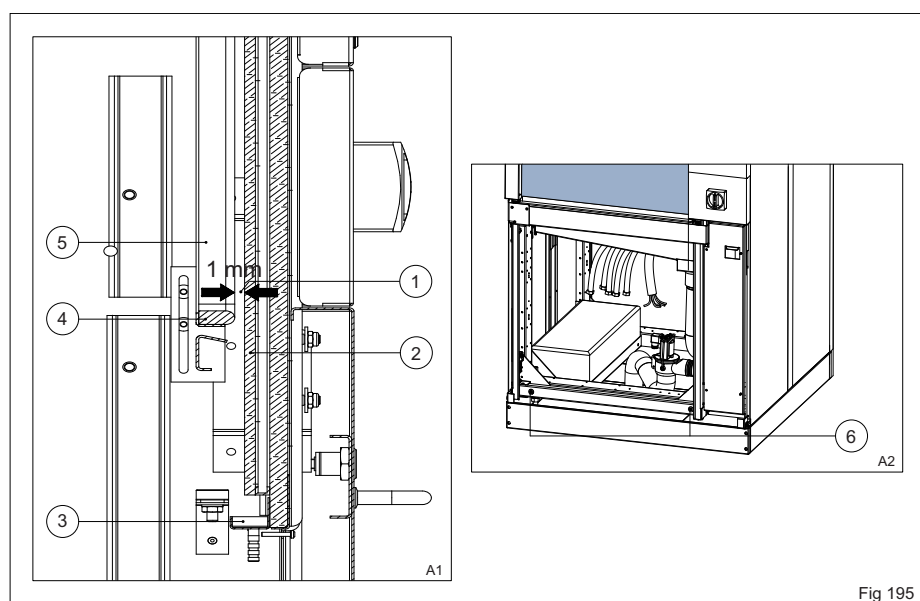
- 1 Door frame
- 2 Minimum clearance between Pos.1 and Pos.3
- 3 Belt attachment
- 4 Door seal
- 5 Drip tray
- 6 Washing chamber door
- 7 Washing chamber drip panel
- 8 Safety switch actuator

### 12.15.5 Readjusting door clearance

Over time, the clearance (Fig. 195 Pos.1) between seal (Fig. 195 Pos.4) and door (Fig. 195 Pos.2) increases due to the settling process. This clearance must not exceed **1 mm**.


**Note**

Readjust the door once a year. Otherwise there is a risk of doors not closing tightly any more (see Chap. 6.10.10 "Entering door contact pressure").



- 1 Clearance washing chamber door/door seal
- 2 Washing chamber door
- 3 Drip tray
- 4 Door seal
- 5 Door frame
- 6 Screws for door adjustment


**Note**

The washing chamber must be warm while adjusting (after completion of a program cycle).

- ▶ Open the door and interrupt at approx. 2/3 open position using button 
- ▶ Readjust screws (Fig. 195 Pos.6) until clearance is 1 mm (Fig. 195 Pos.1)

### 12.15.6 Calibrate door setting

(See Chap. 6.11.8 "LS door frame final position when doors are open" and the following)

## 12.16 Pull out electro drawer

**Danger**

The device must always be disconnected from the mains before carrying out electrical servicing of any kind. Danger to life!

- ▶ Remove panels (Fig. 217)
- ▶ Remove lid from switch box (Fig. 217 Pos.4)
- ▶ Remove angle plate screws (Fig. 217 Pos.1)
- ▶ Remove base frame screws (Fig. 217 Pos.5)
- ▶ Unplug switch (Fig. 217 Pos.3)
- ▶ Pull out electro drawer (Fig. 217 Pos.2)

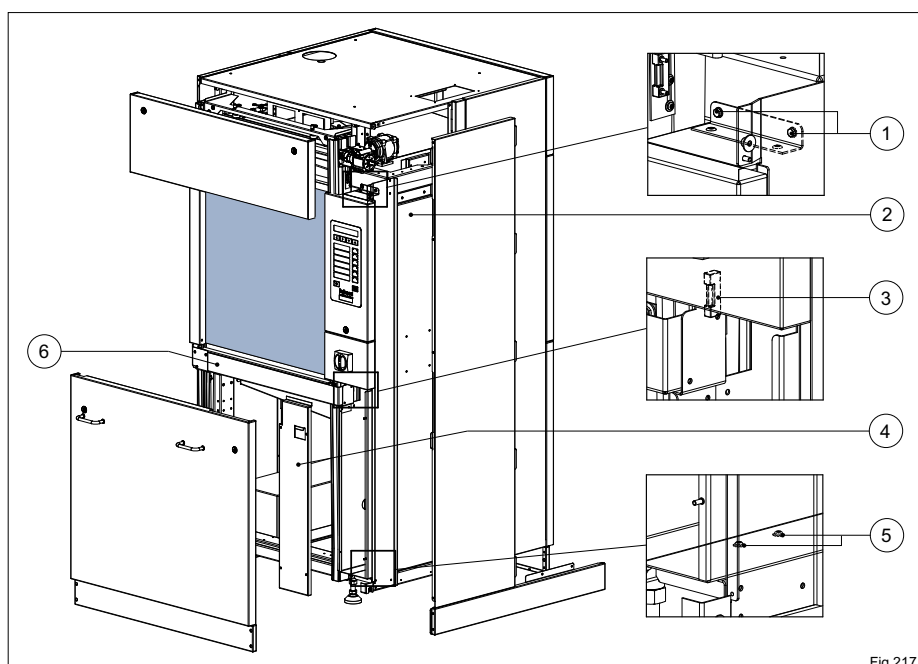


Fig 217

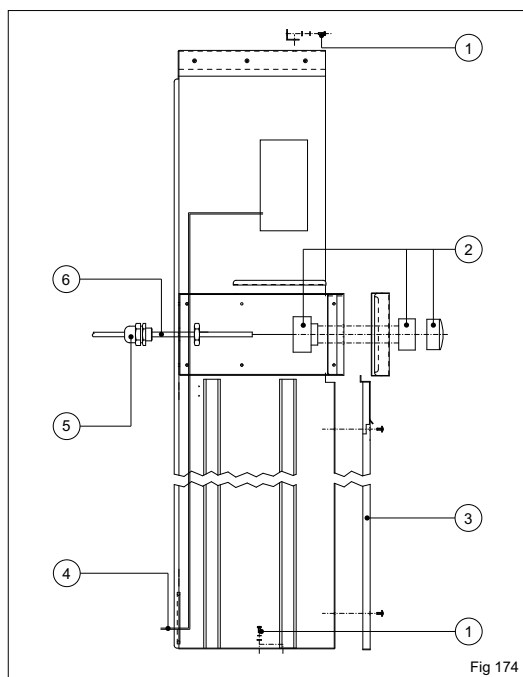
- 1 Angle plate screws
- 2 Complete electro drawer
- 3 Switch
- 4 Switch box lid
- 5 Base frame screws
- 6 Cross bar

## 12.17 Maintenance of electrical installations



### Danger

The device must always be disconnected from the mains before carrying out electrical servicing of any kind. Danger to life!



- 1 Mounting screws
- 2 Load disconnecting switch (main switch)
- 3 Switch box lid
- 4 Network cable
- 5 Screwed cable fitting
- 6 Mains lead

- Unscrew upper and lower mounting screws (Fig. 174 Pos.1) and pull out the whole box.



### Note

The mains lead (Fig. 174 Pos.6) and the network cable (Fig. 174 Pos.4) must be sufficiently long to enable pulling out of the electro drawer.

- Check the whole electrical installation for signs of burning or melting.



### Caution

Replace damaged or defective parts immediately

- Check plug-in and clamp connections and retighten as required. Replace dubious connections.

## 12.18 Dismantling the door system (loading side)

**Danger**

The device must always be disconnected from the mains before carrying out electrical servicing of any kind. Danger to life!

**Warning**

Only carry out maintenance and cleaning work after the device has been allowed to cool.

**Note**

At least 5 m<sup>2</sup> of free space in front of the device are required for dismantling the washing chamber door.

- ▶ Release door contact pressure using button  and remove panels (Fig. 215)
- ▶ Remove cross bar (Fig. 215 Pos.1)

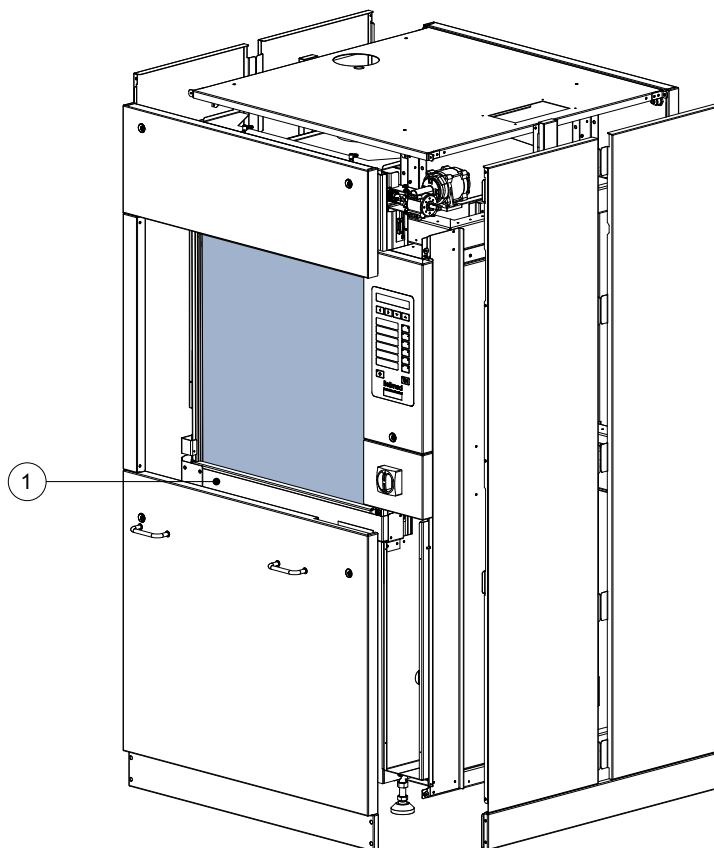


Fig 215

1 Cross bar

- ▶ Unplug switch at bottom (Fig. 148 Pos.3)
- ▶ Pull out complete electro drawer (see Chap. 12.16 "Pull out electro drawer")
- ▶ Remove mounting bracket by unscrewing two screws at the top and bottom respectively (Fig. 148 Pos.7)

- Unplug plug-in connections of door motor incl. operating capacitor and switch at top (Fig. 148 Pos.1+2)
- Dismantle safety switch actuator lead (Fig. 148 Pos.4) and drainage tube (Fig. 148 Pos.5)


**Note**

Dismantle drainage tube at pipe below. Disconnect safety switch actuator lead at terminal strip below.

- Remove screws (Fig. 148 Pos.10) at both sides
- Pull out cotter pin (Fig. 148 Pos.9) at bottom on both sides and remove bolt


**Warning**

Door is standing without attachment and can now fall forward accidentally!

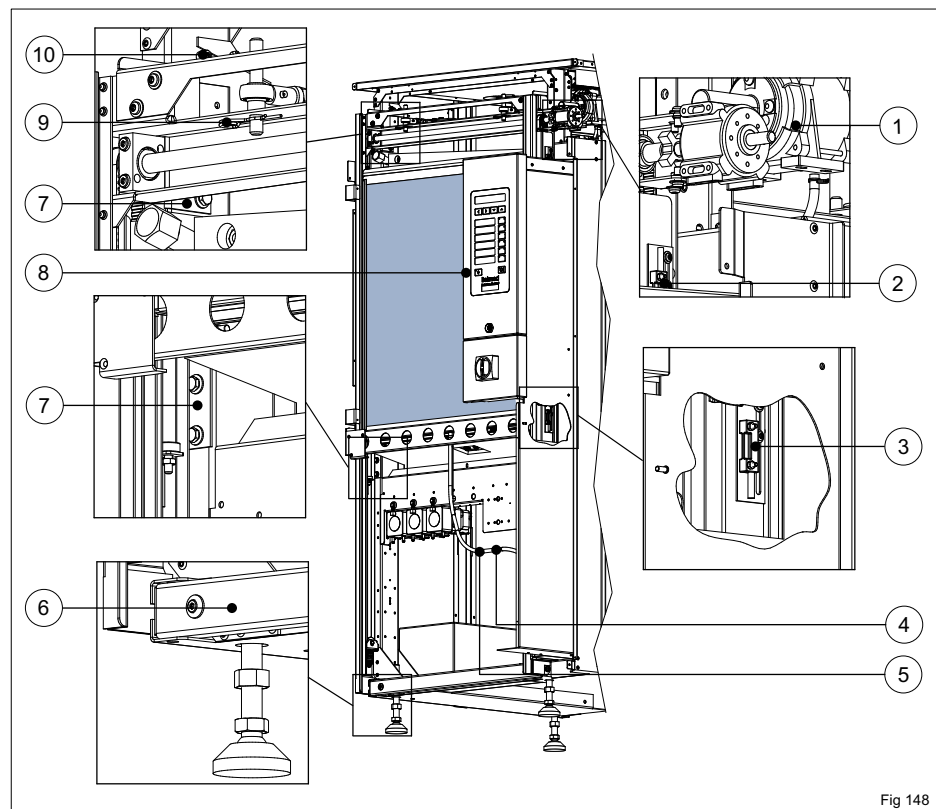
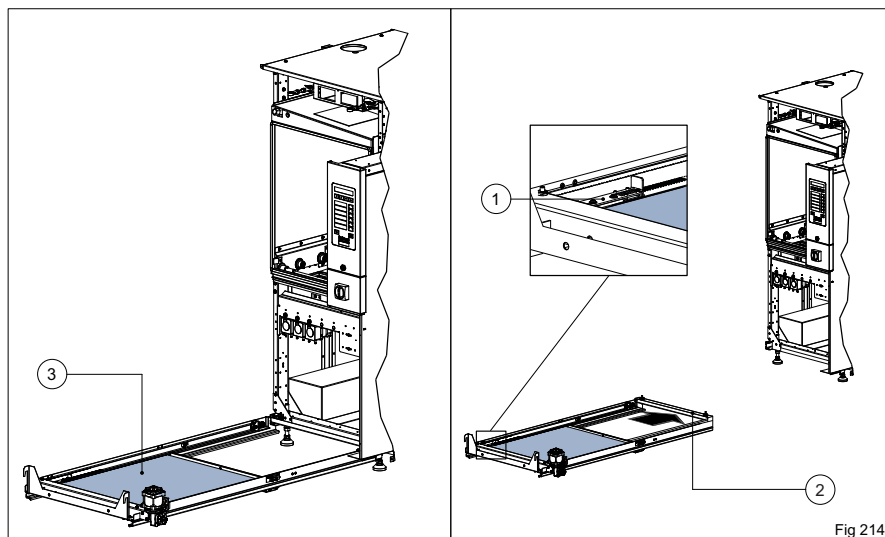


Fig 148

- 1 Gear motor
- 2 Switch at top
- 3 Switch at bottom
- 4 Safety switch actuator lead
- 5 Door tray drainage tube
- 6 Door support bracket screws left/right
- 7 Mounting bracket (upper/lower screws)
- 8 Electro drawer
- 9 Cotter pin

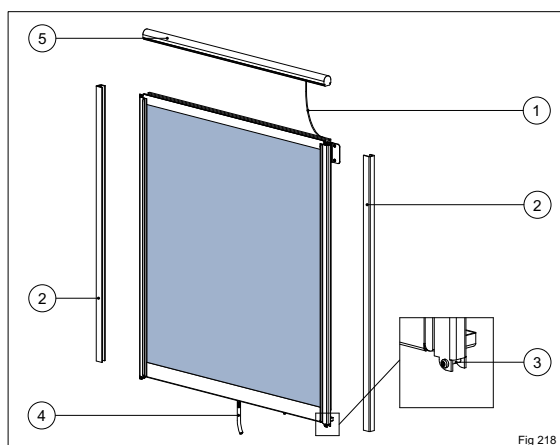
- Lay down complete door front (Fig. 214)

- ▶ Remove door support bracket (Fig. 148 Pos.6) and pull the complete door front away from the device so that the washing chamber door can be pulled out
- ▶ Remove belt bracket (Fig. 214 Pos.1)
- ▶ Remove cross brace (Fig. 214 Pos.2)
- ▶ Slide out washing chamber door in the direction indicated by the arrow (Fig. 214)



- 1 Belt bracket
- 2 Cross brace
- 3 Complete door system

- ▶ Mount diverse Reassemble components of the old washing chamber door (Fig. 218) to the new door
  - ▶ Dismantle drainage tube (Fig. 218 Pos.4)
  - ▶ Dismount safety switch actuator with lead (Fig. 218 Pos.5+1)
  - ▶ Dismount left/right plastic guide (Fig. 218 Pos.2) and Z-screws (Fig. 218 Pos.3)



- 1 Safety switch actuator lead
- 2 Plastic guide left/right
- 3 4 Z-Screws
- 4 Drainage tube
- 5 Safety switch actuator

- ▶ Put new washing chamber door in place and remount complete door front
- ▶ Recalibrate door (see Chap. 6.11.8 "LS door frame final position when doors are open")

## 12.19 Dismantling the door system (unloading side)

**Danger**

The device must always be disconnected from the mains before carrying out electrical servicing of any kind. Danger to life!

**Warning**

Only carry out maintenance and cleaning work after the device has been allowed to cool.

Follow the same procedure for dismantling the door system as for the loading side (see Chap. 12.18 "Dismantling the door system (loading side)").

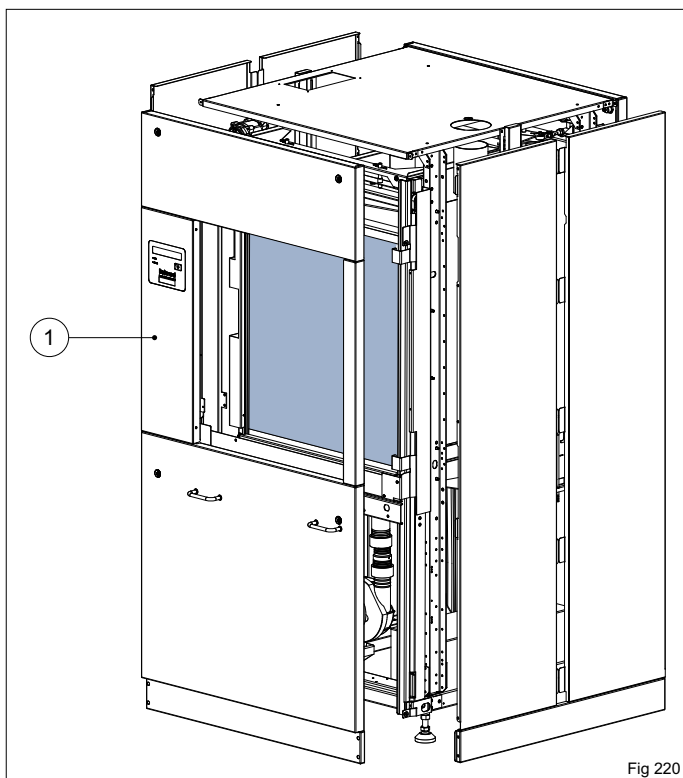


Fig 220

1 US Service door

**Note**

Do not dismantle the electro drawer. Remove US service door only (Fig. 220 Pos.1).

## 12.20 Dismantling linear motors

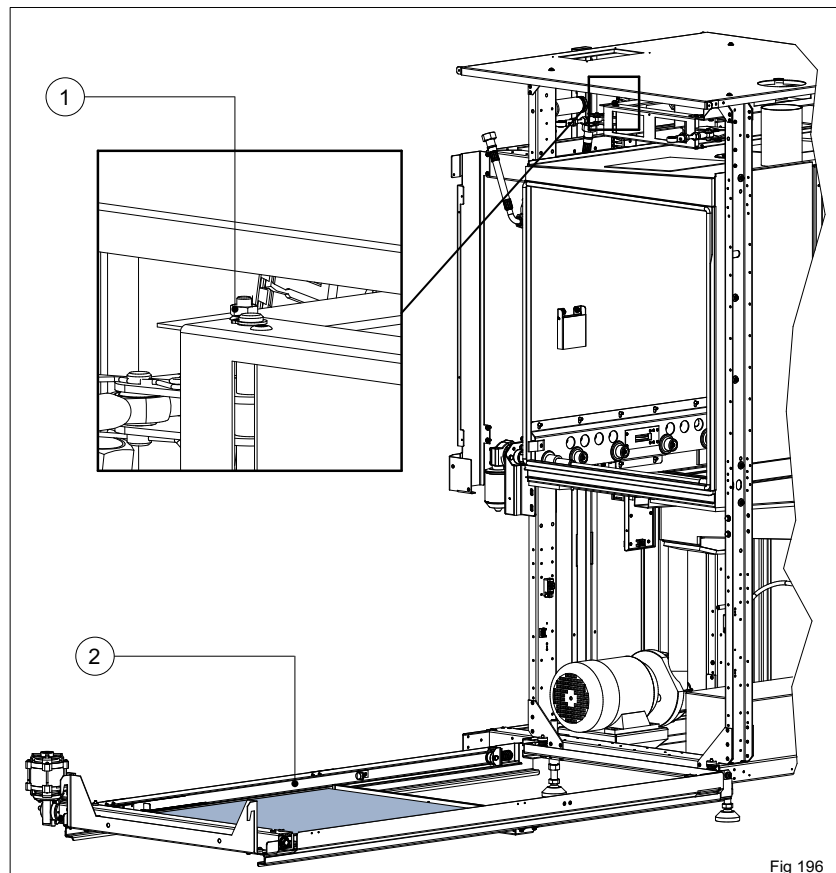
- Dismantle door system (see Chap. 12.19 "Dismantling the door system (unloading side)")



### Note

It is recommended to dismantle the linear motor from the unloading side.

- Loosen left/right stop nuts on US+LS (Fig. 196 Pos.1)



- 1 Stop nuts for attachment bracket
- 2 Complete door system

- Slightly lift and pull out the complete linear drive module (Fig. 149 Pos.1)
  - To enable removal, first remove cotter spring and bolt on LS (see Chap. 12.18 "Dismantling the door system (loading side)").

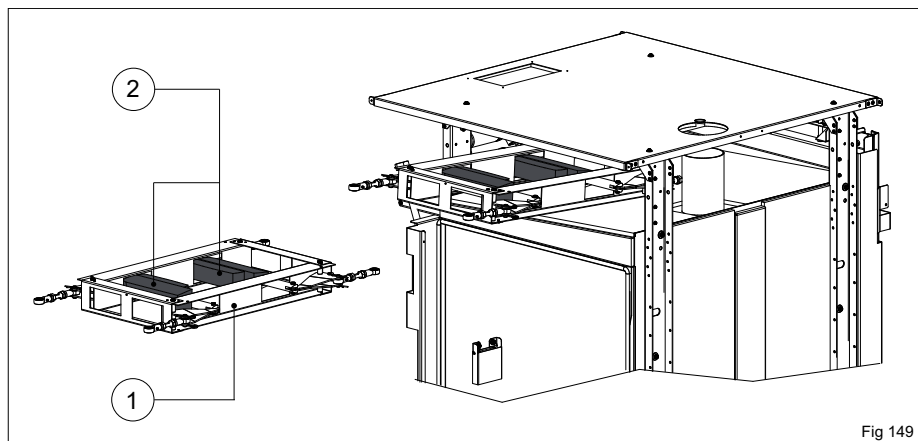


Fig 149

- 1 Complete linear module
- 2 Linear drive LS/US

- ▶ Linear drives (Fig. 149 Pos.2) may now be serviced
- ▶ Reinsert complete linear module
- ▶ Recalibrate LS/US doors (see Chap. 6.11.8 "LS door frame final position when doors are open")

## 12.21 Calibrating temperature sensors

### 12.21.1 Objective

To ensure that temperature sensors lie within the required limit values.



#### Note

Temperature sensors are calibrated by the manufacturer.

#### Maximum tolerance: +/-1 °C at 93 °C

(Temperature sensors for drying (NTC2) and DI tank (NTC4) need not be checked. These are not relevant to the process.

### 12.21.2 Using calibrated reference sensor

- ▶ Remove coarse and fine screens from the washing chamber (see Chap. 12.8 "Cleaning fine screens and coarse screen")
- ▶ Download setup settings from device to PC (see Chap. 9 "Downloading the control software")
- ▶ In the analysis module "Step over", run thermal disinfection at 93 °C for approx. 3 min.

Step over  
Program P1-P6?

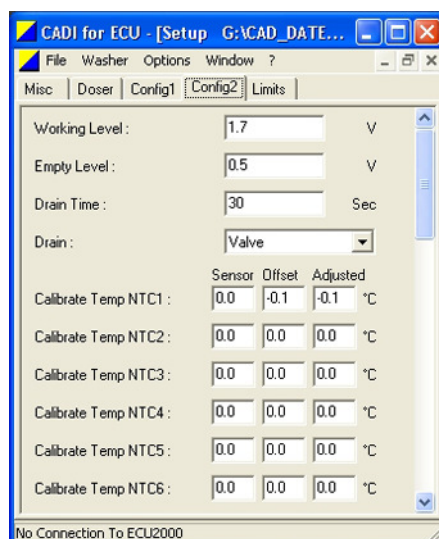
- ▶ Press button . Door opens



#### Danger

Steam may be discharged as soon as door opens! This can cause burn injuries or trigger the smoke detector.

- ▶ Measure temperature at control sensor NTC1 and monitoring sensor NTC5 in tub sump.
- ▶ In *Setup/Config2*, enter Offset for NTC1 and NTC5 until the value in the "Adjusted" field agrees with the reference sensor



- ▶ Reload adjusted values to the device with *Washer/Write to Washer*, and save on PC with *File/Save*

### 12.21.3 Using calibrating bath

- Immerse NTC1 and NTC5 in tub sump in calibrating bath at 93 °C.

**Note**

Dryer-calibrators are unsuitable, as the sensor is too short.

**Maximum tolerance: +/-1 °C at 93 °C**

- If the values are outside the tolerance range, the respective sensor must be corrected (see Chap. 6.11.6 "Calibrating the temperature sensors")

### 12.22 Automatic loading and unloading (optional)

For correct and intended operation and maintenance it is absolutely necessary to follow the instructions supplied with the automated loading and unloading module.

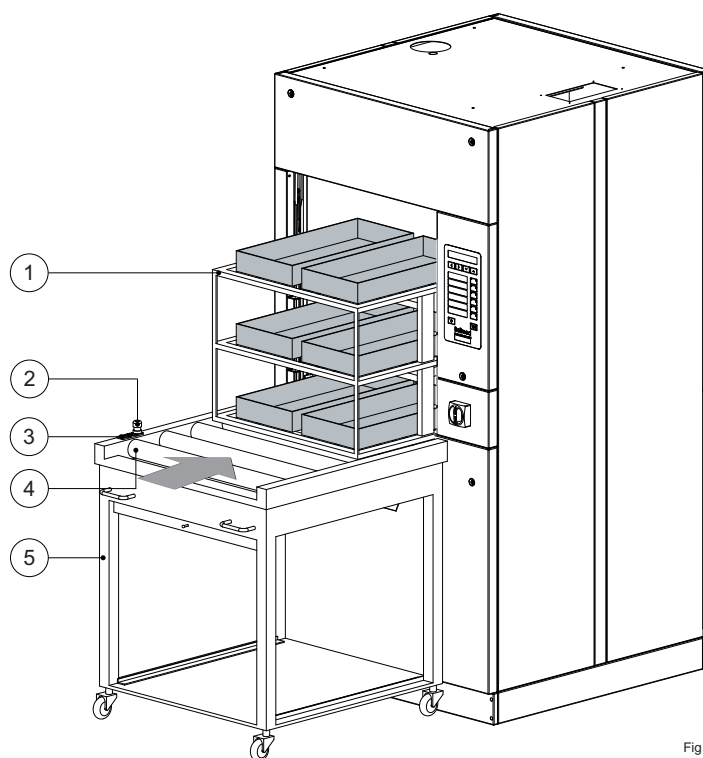


Fig 206

- 1 Rack
- 2 Emergency Stop
- 3 Operating buttons
- 4 Automatically driven rollers
- 5 Automatic loading and unloading module

## **13 Disposal**

### **13.1 Disposing of packaging material**

Packaging material (cardboard, plastic, wood, EPS polystyrene etc.) is labelled according to type and should as far as possible be recycled and disposed of without causing environmental pollution.

### **13.2 Disposal of the device**

The old device is not worthless waste material. If disposed of appropriately, the raw materials can be recovered and re-used. Make sure that the device is disposed of in accordance with current locally applicable government laws and regulations.

## 14 Conformity and certifications

### KONFORMITÄTSERKLÄRUNG DÉCLARATION DE CONFORMITÉ DECLARATION OF CONFORMITY



**Belimed AG**  
**Dorfstrasse 4**  
**CH-6275 Ballwil**

Name und Adresse des Herstellers/ Nom et adresse de fabricant/ Name and address of the manufacturer

Wir erklären in alleiniger Verantwortung, dass der Reinigungs- und Desinfektionsautomat  
 Nous déclarons sous notre propre responsabilité que l'automate de lavage et de désinfection  
 Under our sole responsibility we herewith declare that the washer and disinfectors

Typ: **WD 290** Serien-Nr.: **99801... 99802... 99803... 99839...**

nach Anhang IX der Richtlinie 93/42/EWG, als ein Medizinprodukt der Klasse IIA eingestuft wird und gemäss der Bestimmungen der Richtlinien  
 est conforme, selon l'annexe IX de la directive 93/42/CEE sur les dispositifs médicaux de la classe IIA, aux directives des normes  
 according to annex IX of directive 93/42EEC, is rated as a medical device of class IIA and under the terms of reference

**93/42/EWG; 2006/95/EG; 2004/108/EG**  
**93/42/CEE; 2006/95/CE; 2004/108/CE**  
**93/42/EEC; 2006/95/EC; 2004/108/EC**

mit den folgenden harmonisierten Normen, nationalen Normen oder normativen Dokumenten übereinstimmt.  
 selon les normes harmonisées, les normes nationales ou autres documents normatifs suivants.  
 is conform with the following harmonised standards, national standards or other normative documents.

**Sicherheit** DIN EN 61010-1: 2002-08  
**EMV** DIN EN 61010-2-040: 2006-02  
 DIN EN 61326-1: 2002-03;  
 EN 61326: 1997 +A1: 1998; A2: 2001;  
 IEC 61326-1: 1997 +A1: 1998 +A2 :2000  
**SVGW** W/TPW 106: 01/05, EN EN61770  
**Typenprüfung** nach EN ISO 15883-1: 2006

Konformitätsbewertungsverfahren  
 Procédure d'évaluation de la conformité  
 Conformity assessment procedure

Nach 93/42 EWG, Anhang II  
 (Vollständiges Qualitätssicherungssystem)

Konformitätsbewertungsstelle  
 Organisme notifié  
 Notified Body

CE 0044



Prüfzeichen  
 Label de test  
 Test characters



Ballwil, 21. April 2008  
 Ort Datum / Lieu date /Place date

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 Head Research & Development  
 Belimed AG

E. Ammann  
 Head Application / Process Engineering  
 Belimed AG

Verteiler: Intranet  
 Erstellt/geändert: MAVAH  
 Datum: 03.01.06

Überprüft/ genehmigt: MA  
 Datum: 03.01.06  
 Kopie unterliegt nicht dem Änderungsdienst

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 Index C

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Fig 150

## 16 Notes